CONTROL-M/Tape Implementation Guide

Supporting

CONTROL-M/Tape version 6.3.01

February 2008

ACTIVATE BUSINESS WITH THE POWER OF I.T.™

www.bmc.com

Contacting BMC Software

You can access the BMC Software website at http://www.bmc.com. From this website, you can obtain information about the company, its products, corporate offices, special events, and career opportunities.

United States and Canada

Address	BMC SOFTWARE INC 2101 CITYWEST BLVD HOUSTON TX 77042-2827 USA	**Telephone**	713 918 8800 or 800 841 2031	**Fax**	713 918 8000

Outside United States and Canada

Telephone	(01) 713 918 8800	**Fax**	(01) 713 918 8000

Customer support

You can obtain technical support by using the BMC Software Customer Support website or by contacting Customer Support by telephone or e-mail. To expedite your inquiry, see "Before contacting BMC."

Support website

You can obtain technical support from BMC 24 hours a day, 7 days a week at http://www.bmc.com/support_home. From this website, you can

- read overviews about support services and programs that BMC offers
- find the most current information about BMC products
- search a database for issues similar to yours and possible solutions
- order or download product documentation
- download products and maintenance
- report an issue or ask a question
- subscribe to receive proactive e-mail alerts when new product notices are released
- find worldwide BMC support center locations and contact information, including e-mail addresses, fax numbers, and telephone numbers

Support by telephone or e-mail

In the United States and Canada, if you need technical support and do not have access to the web, call 800 537 1813 or send an e-mail message to customer_support@bmc.com. (In the subject line, enter **SupID**:<*yourSupportContractID*>, such as SupID:12345). Outside the United States and Canada, contact your local support center for assistance.

Before contacting BMC

Have the following information available so that Customer Support can begin working on your issue immediately:

- product information
    - product name
    - product version (release number)
    - license number and password (trial or permanent)

- operating system and environment information
    - machine type
    - operating system type, version, and service pack or other maintenance level such as PUT or PTF
    - system hardware configuration
    - serial numbers
    - related software (database, application, and communication) including type, version, and service pack or maintenance level

- sequence of events leading to the issue

- commands and options that you used

- messages received (and the time and date that you received them)
    - product error messages
    - messages from the operating system, such as `file system full`
    - messages from related software

Contents

Chapter 3   Global Phased Mode   59

Chapter 4   Global Production Mode   65

Chapter 5   Verifying Media Database Integrity   73

Chapter 6   Data Set Stacking   91

Figures

Tables

CONTROL-M/Tape Implementation Guide

About This Guide

This guide provides the information necessary for implementation of CONTROL-M/Tape at your site. It contains the following chapters:

Chapter 1–Implementation Strategy

Overview of CONTROL-M/Tape implementation and the issues to be considered when implementing CONTROL-M/Tape.

Chapter 2–Global Test Mode

Description of preparation and implementation of CONTROL-M/Tape operation in Global Test mode.

Chapter 3–Global Phased Mode

Description of preparation and implementation of CONTROL-M/Tape operation in Global Phased mode.

Chapter 4–Global Production Mode

Description of preparation and implementation of CONTROL-M/Tape operation in Global Production mode.

Chapter 5–Verifying Media Database Integrity

Description of how to verify Media Database integrity using utility CTTIDB and examples of how to solve in

Chapter 6–Data Set Stacking

Description of the CONTROL-M/Tape Dynamic Data Set Stacking facility, and relevant concepts.

Chapter 7–External Data Managers

Detailed description of how CONTROL-M/Tape interacts with various external data managers.

Chapter 8–Automated Tape Library Interfaces

Detailed description of how CONTROL-M/Tape interfaces with various automated tape libraries.

Chapter 9–Registering External (Foreign) Tapes

Description of CONTROL-M/Tape handling of external tapes, and duplicate volser support.

Chapter 10–CONTROL-M/Tape Support for DFSMS

Description of the CONTROL-M/Tape interface to DFSMS.

Conventions Used in This Guide

Notational conventions that may be used in this guide are explained below.

Standard Keyboard Keys

Keys that appear on the standard keyboard are identified in boldface, for example, **Enter, Shift, Ctrl+S** (a key combination), or **Ctrl S** (a key sequence).

WARNING

The commands, instructions, procedures, and syntax illustrated in this guide presume that the keyboards at your site are mapped in accordance with the EBCDIC character set. Certain special characters are referred to in this documentation, and you must ensure that your keyboard enables you to generate accurate EBCDIC hex codes. This is particularly true on keyboards that have been adapted to show local or national symbols. You should verify that

$ is mapped to x'5B'
# is mapped to x'7B'
@ is mapped to x'7C'

If you have any questions about whether your keyboard is properly mapped, contact your system administrator.

Preconfigured PFKeys

Many commands are preconfigured to specific keys or key combinations. This is particularly true with regard to numbered PF keys, or pairs of numbered PFKeys. For example, the END command is preconfigured to, and indicated as, **PF03/PF15**. To execute the END command, press either the **PF03** key or the **PF15** key.

Instructions to enter commands may include

- only the name of the command, such as, enter the END command
- only the PF keys, such as, press **PF03/PF15**
- or both, such as, press **PF03/PF15,** or enter the END command

Command Lines and Option Fields

Most screens contain a command line, which is primarily used to identify a single field where commands, or options, or both, are to be entered. These fields are usually designated COMMAND, but they are occasionally identified as COMMAND/OPT or COMMAND/OPTION.

Option field headings appear in many screens. These headings sometimes appear in the screen examples as OPTION, or OPT, or O.

Names of Commands, Fields, Files, Functions, Jobs, Libraries, Members, Missions, Options, Parameters, Reports, Subparameters, and Users

The names of commands, fields, functions, jobs, libraries, members, missions, options, parameters, reports, subparameters, users, and most files, are shown in standard UPPERCASE font.

User Entries

In situations where you are instructed to enter characters using the keyboard, the specific characters to be entered are shown in this **UPPERCASE BOLD** text, for example, type **EXITNAME.**

Syntax statements

In syntax, the following additional conventions apply:

- A vertical bar (|) separating items indicates that you must choose one item. In the following example, you would choose *a*, *b,* or *c*:

  ```
  a | b| c
  ```

- An ellipsis (. . .) indicates that you can repeat the preceding item or items as many times as necessary.

- Square brackets ([ ]) around an item indicate that the item is optional. If square brackets ([ ]) are around a group of items, this indicates that the item is optional, and you may choose to implement any single item in the group. Square brackets can open ([ ) and close ( ]) on the same line of text, or may begin on one line of text and end, with the choices being stacked, one or more lines later.

- Braces ({ }) around a group of items indicates that the item is mandatory, and you must choose to implement a single item in the group. Braces can open ({) and close (}) on the same line of text, or may begin on one line of text and end, with the choices being stacked, one or more lines later.

Screen Characters

`All syntax, operating system terms, and literal examples are presented in this typeface.` This includes JCL calls, code examples, control statements, and system messages. Examples of this are:

- calls, such as

  ```
  CALL 'CBLTDLI'
  ```

- code examples, such as

  ```
  FOR TABLE owner.name USE option, . . . ;
  ```

- control statements, such as

  *//*PRDSYSIN DD * USERLOAD PRD(2) PRINT

- system messages, both stand-alone, such as `You are not logged on to database database_name`, and those embedded in text, such as the message `You are not logged on to database database_name`, are displayed on the screen.

Variables

Variables are identified with *italic* text. Examples of this are:

- In syntax or message text, such as
  `Specify database` *database_name*
- In regular text, such as
  replace database *database_name1* with database *database_name2* for the current session
- In a version number, such as
  EXTENDED BUFFER MANAGER for IMS 4.1.*xx*

Special elements

This book includes special elements called *notes* and *warnings*:

—— *NOTE* ————————————————————
Notes provide additional information about the current subject.

—— *WARNING* ————————————————————
Warnings alert you to situations that can cause problems, such as loss of data, if you do not follow instructions carefully.

Information New to This Version

Where substantive additions and modifications to the content of this guide occur, revision bars have been inserted in the margin.

Related Publications

CONTROL-M/Tape Conversion Guide

Detailed instructions for converting from your current tape management system to the CONTROL-M/Tape tape management system.

CONTROL-M/Tape User Guide

Comprehensive information about the functions, features, and operation of CONTROL-M/Tape.

INCONTROL for z/OS Administrator Guide

Information for system administrators about customizing and maintaining INCONTROL™ products.

INCONTROL for z/OS Installation Guide

A step by step guide to installing INCONTROL products using the INCONTROL™ Customization and Installation Engine (ICE) application.

INCONTROL for z/OS Messages Manual

Comprehensive listing and explanation of INCONTROL messages and codes.

INCONTROL for z/OS Security Guide

Step by step guide to implementing security in INCONTROL products using the ICE application.

INCONTROL for z/OS Utilities Guide

Describes utilities designed to perform specific administrative tasks that are available to INCONTROL products.

Implementation Strategy

This chapter includes the following topics:

Overview

CONTROL-M/Tape can have a major impact on the management and control of all your removable media. CONTROL-M/Tape can apply automated media management to every component of your operations environment and drastically reduce the need for human intervention and consequent errors.

CONTROL-M/Tape is gradually phased through operation in various modes, culminating in a fully operational CONTROL-M/Tape and termination of your existing tape management system. Gradual transition from the existing tape management system to CONTROL-M/Tape through the various CONTROL-M/Tape operation modes is described in this guide.

> **— NOTE —**
> Advanced features and customization should be added only when basic CONTROL-M/Tape functioning has been tested and CONTROL-M/Tape is already operating in production mode.

CONTROL-M/Tape operation modes play a central role in migration to CONTROL-M/Tape. It is therefore important to understand the differences between the various modes and the role they play in CONTROL-M/Tape implementation.

CONTROL-M/Tape operation mode is specified using the MODET parameter in the CTTPARM member as shown in the following screen:

```
000001 *************************************************
000002 *        CONTROL-M/TAPE SOURCE PARAMETERS MEMBER
000003 *        --------------------------------
000004 *        CREATED BY ICE ON: 2001/10/14  17:08
000005 *        USERID: K27
000006 *************************************************
000007 *----------------------------
000008 *    INITIALIZATION SECTION
000009 *----------------------------
000010 INIT    MODET=PROD,       GLOBAL MODE (PROD,TEST,PHASED)
000011         DYNINTR=Y,    CREATE DYNAMIC INTERFACES IN MVS (Y/N)
000012         DYNSVC=Y,      DYNAMICALLY INSTALL THE SVC (Y/N)
000013         SVCNUM=243,     CONTROL-M/TAPE SVC NUMBER
000014       TSSALLOC=Y,  SUB-SYSTEM CAN BE DYNAMICALLY ADDED (Y/N)
```

Each time CONTROL-M/Tape mode is modified, tape processing must be halted and tape management data should be reconverted. This is because the processing of tapes during data conversion can result in discrepancies between the existing tape management system database and the CONTROL-M/Tape Media Database.

Plan Implementation Strategy

Before implementing CONTROL-M/Tape, it is important to review your current system. Information gathered at this stage will help determine procedures used later during CONTROL-M/Tape implementation. Some of this information will also be used to determine appropriate values for certain CONTROL-M/Tape installation parameters.

Answer the following questions about your current tape management configuration:

- What is the existing tape management system?
- What automated tape libraries are used?
- What external data manager (EDM) is used?
- What restart management software (if any) is used?
- What reports are generated by your current tape management system?
- How is tape movement and storage organized?
- What security product is used and how is it implemented?
- What additional tape management issues are relevant at your site?
- How (meaning, with what configuration) was CONTROL-M/Tape installed?
- Who will be responsible for implementation tasks?
- Where are CONTROL-M/Tape repository files allocated?

Each of these questions is described in detail below.

What is the Existing Tape Management System?

Determine the name and release of the tape management software that is being replaced by CONTROL-M/Tape.

Automatic conversion programs currently exist for sites with CA-1, CA-TLMS, CA-EPIC/MVS, DFSMS*rmm*, and the MVS Catalog (for sites with no tape management system). If you are using a different system (that is, one not listed here) to manage your tape library, it is recommended that you contact your INCONTROL representative before implementing CONTROL-M/Tape.

> **— NOTE ——————————————————————————————————————**
> A conversion program for sites with Zara is also available from BMC Software Customer Support.

Information Required

■ Name and release number of the existing tape management system.

■ Name and location of relevant files and libraries (for example, for CA-1, name and location of the TMC, RDS, and VPD files).

What Automated Tape Libraries Are Used?

Information Required

■ Name (vendor) and model of the automated tape libraries in use at your site.
■ Software configuration for the automated tape libraries.

> **— NOTE ——————————————————————————————————————**
> If StorageTek automated tape libraries are in use at your site, it is important to note whether HSC, CSC, and Expert Library Manager (ExLM) software is used.

What External Data Manager (EDM) is Used?

CONTROL-M/Tape can interface with a variety of different External Data Managers (EDMs). For more information about CONTROL-M/Tape/EDM interfaces, see Chapter 7, "External Data Managers."

Information Required:

■ the name of EDMs in use at your site (for example, DFSMShsm)

■ for each of the EDMs at your site, determine the following:

— whether the existing tape management system has an interface to the EDM

— the identifiers of EDM-controlled data sets (for example, program names, or data set name prefixes)

— the name and location of the EDM JCL procedure

What Restart Management Software (if any) is Used?

Determine if a restart management package (for example, CONTROL-M/Restart) exists at your site, and if the existing tape management system interfaces with it.

If such an interface exists, determine the library naming conventions for the restart management package, and where the interface exit routine resides (meaning, in what load library).

Information Required

- Name of the restart management package in use at your site.
- Library naming conventions for the restart management product.
- Name of the load library containing the exit routine used by the restart management product.

What Reports are Generated by the Current Tape Management System?

Determine reports generated by the existing tape management system, and who receives those reports (meaning, which recipients should be notified of a change to the tape management system).

CONTROL-M/Tape has a versatile reporting facility that enables you to produce reports compatible with those produced by the existing tape management system. Compatible reports are compared during implementation to evaluate CONTROL-M/Tape performance in a format familiar to you and your tape management staff.

Information Required

- Name and location of the reports generated by the existing tape management system.

- Format of tape management reports currently in use at your site (for example, information included in the report).

How is Tape Movement and Storage Organized?

List all on-site and off-site tape storage facilities. For each of these facilities determine:

■ Location and size.
■ Types of media stored in the location.
■ Naming conventions.
■ Slot or Box configuration.
■ Amount of traffic to and from the storage facility.
■ Identify existing procedures for handling tapes received from external sources (for example, other data centers or vendors).

What Security Product is Used and How is it Implemented?

Determine which security product is in use at your site (for example, CA-TOP SECRET, CA-ACF2, or RACF).

Determine how the security package interacts with the existing tape management system.

Information Required

■ Name of the security product.
■ List of tape management entities protected by current security definitions.

What Additional Tape Management Issues are Relevant at Your Site?

Determine if DFSMS is used at your site to manage tape data sets (meaning, system managed tape data sets).

Determine if special EXPDT keywords are used in JCL at your site (for example, EXPDT=99000, and EXPDT=99365).

— **NOTE** —
No JCL changes are needed to support information in EXPDT keywords under CONTROL-M/Tape. However, certain CONTROL-M/Tape installation parameters will need to be adjusted according to whether these keywords are in use, and for which product (CA-1 or CA-TLMS).

Determine if other software products at your site interact with the existing tape management system.

Information Required

- Location of JCLs using EXPDT keywords.
- Names and descriptions of other components of your computing environment that interface with your current tape management system.

How Was CONTROL-M/Tape Installed?

If CONTROL-M/Tape was initially installed using the default configuration (meaning, a small Media Database was created for testing purposes), review the following information to ensure that CONTROL-M/Tape is set up properly for your production environment.

Information Required

- Sizes allocated for CONTROL-M/Tape libraries (CONTROL-M/Tape installation steps 5.1, 5.2, and 5.3). The sizes used for CONTROL-M/Tape implementation must reflect actual site usage.

- Installation parameter settings (in CTTPARM). These parameters must be adjusted according to information gathered while reviewing the current system (described above).

- Password assigned for CONTROL-M/Tape. For more details, see CONTROL-M/Tape installation step 1.2.

Who Will be Responsible for Implementation Tasks?

Compile a list of the personnel who will be involved in CONTROL-M/Tape implementation.

Information Required

- The following is a sample list of human resources and their respective tasks during CONTROL-M/Tape implementation. The actual list may vary according to site management requirements. Identify the relevant personnel for future reference.

Table 1   Human Resources for CONTROL-M/Tape Implementation

Resource	Responsibility
Tape Library Administrator	Coordination of all aspects of CONTROL-M/Tape implementation.
SMP/e Administrator	CONTROL-M/Tape installation and application of periodic maintenance.
Security Administrator	Security setup and support.
Systems Programmer in Charge of EDMs and Backups	Application of interfaces to External Data Managers (EDMs) and other related software.
Production Administrator	Integration of CONTROL-M/Tape procedures into the production schedule. Interface with restart management software (for example, CONTROL-M/Restart).
Operations Personnel	Use of CONTROL-M/Tape features. These individuals typically undergo CONTROL-M/Tape training before or during CONTROL-M/Tape implementation. Contact your local INCONTROL representative for information about available training options.

Where are CONTROL-M/Tape Repository Files Allocated?

Determine where each file in the CONTROL-M/Tape repository is allocated. The CONTROL-M/Tape repository consists primarily of the following files:

Table 2   CONTROL-M/Tape Repository Files

File	Description
Media Database	All information about data sets and volumes managed by CONTROL-M/Tape.
Stacking Database	Statistical information on each data set. Used for calculating the amount of space needed for storage of each data set.
Trace file	A record of all important activities in the CONTROL-M/Tape environment. Used for recovery of the Media Database and for tracking.

The Media Database and the Stacking Database are each composed of two physical files:

Table 3   Media Database and the Stacking Database

File	Description
Data file	Contains information stored in the file, as described in Table 2.
Index file	Provides keyed access to information in the Data file.

Additional considerations for CONTROL-M/Tape file allocation are described below.

Performance

For optimum performance, data and index files should reside on separate DASD volumes and the Trace file should reside on yet a different volume. This requires a minimum of three separate DASD volumes.

Figure 1   File Allocation

Allocating files differently than described above may result in poor performance.

You can choose to allocate files differently for operation during Global Test mode. However, it is recommended that you use file allocations during Global Test mode that match the allocations that you expect to use for operation of CONTROL-M/Tape in Global Production mode. This will enable you to accurately evaluate CONTROL-M/Tape performance (for example, processing time) while operating in Global Test mode.

Multi-CPU Considerations

If two or more CPUs share one CONTROL-M/Tape (installed on shared DASD) and one Media Database at your site, this Media Database must be stored on shared DASD.

Figure 2   Shared Media Database and CONTROL-M/Tape Configuration
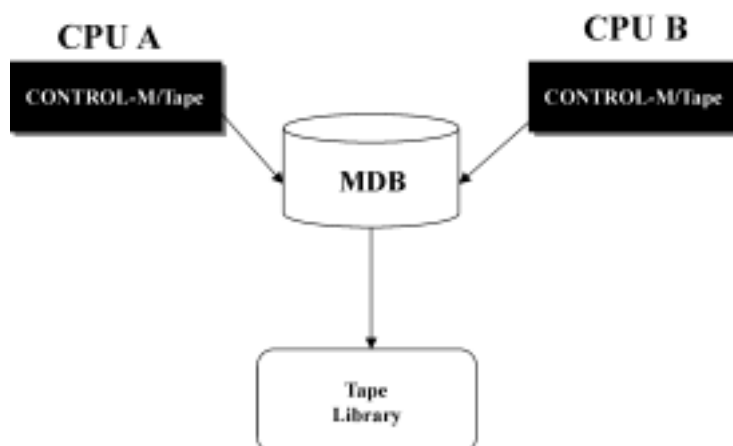
If different copies of CONTROL-M/Tape at your site each use their own Media Database, it is highly recommended that you physically divide your tape library (meaning, tapes managed by each CONTROL-M/Tape should be stored separately)

Figure 3   Separate Media Database and CONTROL-M/Tape Configuration.
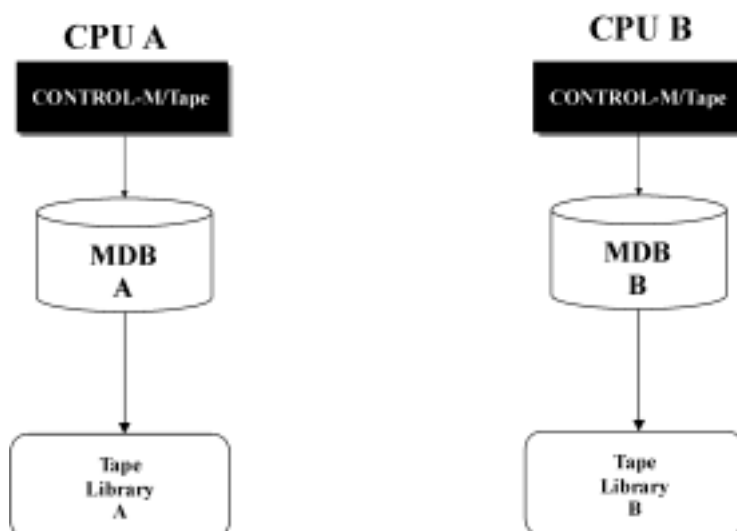
Convert Tape Management Data

Conversion is the process that extracts information stored in the existing tape management system and formats the data so that it can be used by CONTROL-M/Tape. Programs supplied with CONTROL-M/Tape enable you to automatically perform many of the steps necessary for conversion. The actual process of conversion differs, depending on the tape management system currently in use at your site.

Conversion is typically performed before switching CONTROL-M/Tape modes (described below). Conversion may need to be performed multiple times (usually during operation in Global Test mode) while CONTROL-M/Tape is synchronized with the existing tape management system.

Conversion to CONTROL-M/Tape is described for the following products:

■ CA-1
■ CA-TLMS
■ CA-EPIC/MVS
■ DF/SMSrmm
■ MVS Catalog

For more information about the conversion process and conversion from specific products, see the *CONTROL-M/Tape Conversion Guide*.

Global Test Mode

This mode allows you to test CONTROL-M/Tape without affecting the production environment. Global Test mode is activated after the Media Database and CONTROL-M/Tape rules have been created from information extracted from the tape management system being replaced.

In Global Test mode, the existing tape management system manages the production environment (for example, decides whether to accept a tape, protects data sets, issues prompts to the operator, uncatalogs expired data sets). CONTROL-M/Tape updates the Media Database when its decisions match those of the existing tape management system. CONTROL-M/Tape also sends warning messages to the Job log, System log, or Operator console if there is a contradiction between what the existing tape management system is doing and what CONTROL-M/Tape would do if it were in Global Production mode.

In this mode, operators compare reports (for example, scratch reports, vault reports) generated by the existing tape management system to analogous reports produced by CONTROL-M/Tape.

When the two systems' reports match and CONTROL-M/Tape operates according to your expectations, the next step is to enable CONTROL-M/Tape and the other tape management system to operate simultaneously (in Global Phased mode).

Global Phased Mode

Global Phased mode is used when you are reasonably certain that CONTROL-M/Tape will operate in the same way as the existing tape management system. This mode enables both CONTROL-M/Tape and the existing tape management system to be fully operational simultaneously. The objective of Global Phased mode is to check the execution of CONTROL-M/Tape in the production environment.

In this mode, CONTROL-M/Tape and the existing tape management system each rely on their own media management decisions. These decisions must be the same. This is usually not a problem since Global Phased mode is used only after the CONTROL-M/Tape Media Database and existing tape management system database have been synchronized (while CONTROL-M/Tape was in Global Test mode).

During Global Phased mode, extended media management, such as automated tape library utilization, can be tested and "phased in" gradually. Procedures to be performed at the beginning of the working day and tape initialization requirements can also be implemented while in Global Phased mode.

Optionally, you can allow CONTROL-M/Tape to operate in production mode for selected libraries while the other tape management system controls and manages media processing for all other libraries.

Global Production Mode

In Global Production mode, CONTROL-M/Tape completely controls all tape processing at your site.

This mode is used when testing has been completed and you are certain that CONTROL-M/Tape functions in the same manner as your existing tape management system. Before Global Production mode is specified, the existing tape management system must be removed from the system. Be sure to remove static system hooks in operating system routines that were used by the tape management system that is being replaced by CONTROL-M/Tape.

CONTROL-M/Tape Interfaces

CONTROL-M/Tape can interface with a variety of different components of your computing environment. The interfaces for these components are implemented at various stages during CONTROL-M/Tape implementation. Each type of interface is described in detail later in this guide.

Interfaces with the following software components are provided:

- Automated Tape Library and Virtual Tape Server, described in Chapter 8, "Automated Tape Library Interface and Virtual Tape Server".

- External Data Managers, described in Chapter 7, "External Data Managers".

- Security Software, described in the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Security Guide*.

- Restart Management software, described in the section on CONTROL-M/Restart support in the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Administrator Guide*.

Implement Advanced CONTROL-M/Tape Features

When CONTROL-M/Tape is operating in Global Production mode, additional functionality can be added by customizing and tuning the existing tape management definitions, and by implementing unique CONTROL-M/Tape facilities.

Customization and Tuning

After CONTROL-M/Tape has been implemented and is operating is a way compatible with the operation of your previous tape management system, you may choose to implement advanced CONTROL-M/Tape features and customization.

- Combine CONTROL-M/Tape rules by replacing selection criteria (in ON statements) with masks and by implementation of working calendars using the IOA Calendar facility.

■ Customize the tape management environment to maximize benefits provided by CONTROL-M/Tape. This process includes:

— Tuning of pool, vault, and rule definitions for optimum hardware and system utilization.

— Reducing the number of rules created during the conversion process by defining generic rules for groups of jobs, data sets, volumes, accounts, and so on.

— Defining rules according to applications and for types of processing (for example, month-end runs).

— Defining vault management and pool allocation rules, and modifying existing rules to convert from volume-level retention to data set-level retention.

Unique CONTROL-M/Tape Facilities

CONTROL-M/Tape features that perform tasks not previously possible at your site should not be implemented until after the more basic functions. The actual features that are new to your site depend on what tape management system was used previously at your site. Some unique CONTROL-M/Tape features are:

■ Dynamic Data set Stacking, described on page 92.
■ Support for external (foreign) tapes, described in Chapter 9, "Registering External (Foreign) Tapes."
■ DFSMS support, described on page 166.
■ Fast Positioning, described in the organization and administration chapter of the *CONTROL-M/Tape User Guide*).

Global Test Mode

This chapter includes the following topics:

Overview

Global Test mode is used to observe CONTROL-M/Tape functioning and to adjust CONTROL-M/Tape rules and definitions to eliminate inconsistencies between the existing tape management system and CONTROL-M/Tape. The object of this stage of implementation is to reach a situation in which CONTROL-M/Tape makes the same media management decisions as your current tape management system.

In Global Test mode, CONTROL-M/Tape records information in the Media Database, but does not intervene in any way with media processing (for example, expired data sets are not uncataloged, and volumes are not rejected). All media processing is managed by the existing tape management system.

Global mode of operation is determined by the MODET parameter in the CTTPARM member. Mode of operation can also be specified for specific CONTROL-M/Tape rules. However, when Global Test mode is specified, all rules operate in Test mode regardless of the mode specified in each rule definition.

Before CONTROL-M/Tape is activated in Global Test mode, verify that CONTROL-M/Tape parameters have been set properly, modify user exits as necessary, and implement interfaces with relevant system components (for example, external data managers and automated tape libraries).

While CONTROL-M/Tape is operating in Global Test mode, monitor the databases of CONTROL-M/Tape and the other tape management system, and compare the reports from both systems. If inconsistencies are detected, it may be necessary to modify CONTROL-M/Tape rules and/or regenerate the Media Database by reconverting the database of the other tape management system.

This chapter describes

■ preparation for operating in Global Test mode

— Set installation parameters.
— Establish initialization procedures and New Day procedures.
— Prepare CONTROL-M/Tape reports.

■ operation of CONTROL-M/Tape in Global Test mode

— Start CONTROL-M/Tape in Global Test mode.
— Monitor synchronization of the Media Database and the existing tape management system database.
— Review System and Job log messages.

Preparation

Before CONTROL-M/Tape is activated in Global Test mode, information in the existing tape management system's database and definitions must be converted to CONTROL-M/Tape format. For more information, see the *CONTROL-M/Tape Conversion Guide.*

Installation Parameter Considerations

The CTTPARM member in the IOA PARM library contains CONTROL-M/Tape installation parameters. These parameters are defined during installation of CONTROL-M/Tape.

Before implementing CONTROL-M/Tape in Global Test mode, make sure that CONTROL-M/Tape installation parameter settings are compatible with the existing tape management system and with the environment in which CONTROL-M/Tape is to be implemented.

Adjust the parameters in a way that does not affect your production environment.

Adjust the parameters in a way that is compatible with the existing tape management system. Do not implement features that do not exist in the other tape management system. Doing so may prevent synchronization of CONTROL-M/Tape with the other tape management system.

— *NOTE* —

Installation parameters are managed through the INCONTROL for z/OS Installation and Customization Engine (ICE). To edit these parameters, use Major Step 2 of CONTROL-M/Tape installation. For more information about how to change parameters through ICE, see the *INCONTROL for z/OS Installation Guide.*

Make sure that the following CTTPARM parameters are set appropriately before activating CONTROL-M/Tape in Global Test mode. These parameters are grouped by function in the CTTPARM member, but are listed below in alphabetical order for easier reference.

— *NOTE* —

Only information of special significance to Global Test mode is provided below. For more information about each of these parameters, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Installation Guide.*

Table 4   CTTPARM Parameters (part 1 of 4)

Parameter	Description
BLPDEF	Determines the handling of BLP (Bypass Label Processing) requests. Make sure that this parameter is compatible with your existing tape management system. Appropriate values are: ■ CA-1 BLPDEF – FIRST ■ CA-TLMS BLPDEF – ALL ■ DFSMSrmm BLPDEF – ALL ■ EPIC BLPDEF – ALL
CTLGWAIT	Determines the number of wait days before CONTROL-M/Tape utilities CTTRTM and CTTVTM check for catalog-controlled retention data sets. Ensure that the value specified for this parameter is compatible with your existing tape management system. This parameter is especially relevant if there are data sets at your site whose creation spans more than one day and whose retention is based on their existence in an MVS Catalog.
CYCLECNT	Determines if CONTROL-M/Tape should relate to data sets with the same name, creation date, and jobname, as different generations of the same data set, or as different data sets cycles. Set this parameter to NONE during Global Test mode (meaning, CONTROL-M/Tape handles data sets with the same data set name as separate generations of the same data set).
DEFEXPDT	Specifies the default normal retention period. Make sure that this parameter is compatible with your existing tape management system.
	Note: The rule definition that serves as the default for all retention attributes ($DEFAULT) overrides the DEFEXPDT parameter if Y (Yes) is specified for the OVERJCL parameter, described on page 38.
DYNDS[a]	Determines whether to dynamically add a data set to the CONTROL-M/Tape Media Database, if it is not already registered. For Global Test mode it is recommended that you specify a value of Y (Yes) for this parameter.
DYNSTK	Determines whether the CONTROL-M/Tape Dynamic Data Set Stacking facility is activated. If the Dynamic Data Set Stacking facility is to be activated while CONTROL-M/Tape is running in Global Test mode, specify Y (Yes) for this parameter. For more information, see the STKTEST parameter in this table.
DYNVOLa	Determines whether to dynamically add a volume to the CONTROL-M/Tape Media Database, if it is not already registered. BMC Software recommends that you set DYNVOL to (I,I) (ignore undefined tapes) while in Global Test mode. This ensures that CONTROL-M/Tape operates in a way that is compatible with your existing tape management system.

Table 4   CTTPARM Parameters (part 2 of 4)

Parameter	Description
EXPDTDDN	Name of the DD statement that, when added to the JCL, indicates that special JCL EXPDT keywords should be interpreted as normal dates. Use this parameter when converting from CA-1 or CA-TLMS. Make sure that the value specified is the same as the relevant DD name in the existing tape management system. (For how to handle special JCL EXPDT keywords, see also the EXPDTYPE parameter in this table.)
EXPDTYPE	Specifies the name of the product with which you want CONTROL-M/Tape to be compatible for interpretation of special JCL EXPDT keywords. Make sure you specify the existing tape management system.
	Note: If you want to use special keywords, specify CA-1 for this parameter even if you are not converting from CA-1. For a list of valid EXPDT/RETPD keywords, see the organization and administration chapter of the *CONTROL-M/Tape User Guide*.
MDBWARN	Specifies the Media Database utilization threshold that triggers a notice to the user that the Media Database is becoming full. When the Media Database becomes full, CONTROL-M/Tape stops all processing so that the Media Database can be expanded. It is recommended that you set this parameter no higher than 85%, so that a warning is issued well in advance of CONTROL-M/Tape shutdown.
MODET	CONTROL-M/Tape operation mode. To indicate that CONTROL-M/Tape should operate in Global Test mode set MODET to TEST.
NLASKOP	Determines whether the user should be asked for a confirmation of specific requests for NL/BLP (No Label/Bypass Label Processing) tapes. In Global Test mode, the expression NLASKOP=Y is treated the same way as the expression NLASKOP=N. If you want confirmation messages to be issued during Global Test mode, specify A for this parameter. It is recommended that you specify N for this parameter for operation in Global Test mode.

Table 4   CTTPARM Parameters (part 3 of 4)

Parameter	Description

OVERJCL	Determines whether CONTROL-M/Tape rule definitions override expiration dates set by MVS retention attributes (for example, EXPDT). In Global Test mode, it is recommended that you set this parameter to Y (Yes) to expose inconsistencies between rule definitions and JCL.
	
	If there are situations in which you want to use the JCL specifications, use a DO RETENTION statement in the rule definition to allow the JCL expiration date to be considered for the relevant data sets.
	
	Example:
	
	`DO RETENTION=DAYS      0030            And/Or  A`
	`                    JCL EXPDT`
	`And/Or`

RBTTYPE	Specifies the automated tape libraries to be used. In Global Test mode, CONTROL-M/Tape does not issue any commands to the automated tape libraries at the site. However, a record of automated tape library commands that would have been issued (in Phased or Production mode) is produced as part of the output of the CONTROL-M/Tape New Day procedure (CTTDAY).
RTNTYPE	Determines whether retention is performed on a data set level or on a volume level, or on a multi-volume group. The parameter statement includes two options separated by a comma. The first option is the retention type for a single volume. The second option is the retention type for a multi-volume group. Valid values for a single volume are: ■ DSN - Each data set expires according to its own specified expiration date. That is, the data set becomes scratched regardless of the volume. ■ VOL - All files of a multifile volume expire at the same time (meaning, when the last one expires). This is compatible with other tape management retention methods. Default. Valid values for a multi-volume group are: ■ DSN - - Each data set expires according to its own specified expiration date. That is, the data set becomes scratched regardless of the multi-volume group. ■ GROUP - All files of a multi-volume group expire at the same time (meaning, when the last one expires). This is compatible with other tape management retention methods. Default.
	Note: A volume becomes SCRATCH by the CTTRTM utility only after all its data sets have expired. The CTTRTM utility ignore the retention of the volume except for external volumes, or volumes without any datasets.

Table 4   CTTPARM Parameters (part 4 of 4)

Parameter	Description
RTNUPD	Determines in what situations retention should be updated in the Media Database. Make sure that this parameter is compatible with your existing tape management system.
STKTEST	Determines whether the CONTROL-M/Tape Dynamic Data Set Stacking facility is activated while in Global Test mode. If you choose to run stacking in TEST mode, specify Y for this parameter and specify Y for the DYNSTK parameter. This parameter is ignored if DYNSTK is set to N. If STKTEST is set to Y, CONTROL-M/Tape intervenes in decisions of the existing tape management system regarding where (meaning, on which volumes) data sets are written. Before activating the Dynamic Data Set Stacking facility in Global Test mode, review the description of this facility on page 92.
	Note: Dynamic Data Set Stacking should only be tested on a new pool that is not managed by the existing tape management system.
TRCWARN	Specifies the Trace file utilization threshold that triggers a notice to the user that the Trace file is becoming full. The recommended threshold is 80%.
	Note: To clean the Trace file for reuse, back up the Trace file and the Media Database, as described in the New Day Procedure topic in CONTROL-M/Tape chapter of the *INCONTROL for z/OS Administrator Guide*. This procedure does not require CONTROL-M/Tape to stop processing.
VLTBYDS1	Specifies if the vaulting pattern of a volume is determined by the first data set of the volume (Y), or by the first data set containing vaulting data (N). Make sure that this parameter is compatible with your existing tape management system.
X98ASKOP	Determines the handling of JCL keyword EXPDT=98000 when specified on an output request for a volume in the Media Database. (EXPDT=98000 instructs CONTROL-M/Tape to bypass the tape request.) In Global Test mode, X98ASKOP=P is treated as X98ASKOP=F (that is, CONTROL-M/Tape does not allow operator confirmations so as not to affect the production environment).

^a This parameter can also be specified in a rule.

New Day Procedure

The New Day procedure is the primary mechanism used to perform daily maintenance on the CONTROL-M/Tape Media Database and related files. The New Day procedure (job CTTDAY), can be activated automatically by a scheduler (for example, CONTROL-M) at a predefined time each day. It can also be activated manually.

When establishing the New Day procedure for Global Test mode:

■ Ensure that the order in which various tasks are performed in the New Day procedure is compatible with the existing tape management system. For example, retention management precedes vault management in CA-1, while vault management precedes retention management in CA-TLMS.

Two New Day procedure members (CTTDAY and CTTDAYT) are provided with CONTROL-M/Tape, each with an alternate order of procedures. Ensure that the correct one is used at your site.

—— *NOTE* ————————————————————

If the order of procedures in the CONTROL-M/Tape New Day procedure is different from the order in the other tape management system, it could lead to inconsistencies in retention (reflected in the daily scratch and vaulting reports).

■ Determine which functions should be performed during Global Test mode (for example, retention and vault management processing) and which should not be performed (for example, automated tape library management procedures).

Comment out (//*) the JCL steps that you do not want to run while in Global Test mode (for example, stacking statistics collection). Do not delete these steps. They are used when CONTROL-M/Tape is activated in Global Phased mode and Global Production mode.

■ Make sure that utilities called by the New Day procedure are compatible with the existing tape management system (for example, retention is processed in the same way).

■ Make sure that compatible report formats are used. Customize CONTROL-M/Tape report formats to match the existing system.

CONTROL-M/Tape maintenance functions should run in parallel with (at the same time as) the maintenance utilities of the existing tape management system at your site. New Day procedure CTTDAY is compatible with most tape management systems. If you are converting from CA-TLMS, run CTTDAYT in the JCL library instead of CTTDAY. In CTTDAYT, the vaulting step precedes the retention step in order to maintain compatibility with CA-TLMS.

The following tasks are performed by the New Day procedure:

■ Rule Refresh.
■ Retention Management (CTTRTM).
■ Vault Management (CTTVTM).
■ Gathering Data Set Size Statistics for Stacking (CTTSTK).
■ Media Database and Trace File Backup (CTTTRB).

Each of these tasks is described below, with special attention given to issues relevant for CONTROL-M/Tape operations in Global Test mode.

Rule Refresh

Each working day the New Day procedure calls procedure CTTINIT to review the basic scheduling criteria specified for the CONTROL-M/Tape rules in the rule list. These scheduling criteria determine which rules should be ordered on the current day. This step is mandatory if day or date scheduling criteria are specified in the rules at your site.

If rules have been modified and you want the modifications to take effect immediately, it is necessary to reload the relevant CONTROL-M/Tape rule table. To do this, invoke procedure CTTINIT with the following syntax:

```
S CTTINIT,PARM='MODE=RELOAD,TBLT=RULE'
```

If you do not run procedure CTTINIT at this time, changes to rules are implemented the next time CONTROL-M/Tape is initialized through procedure CTTINIT (most likely as part of the New Day procedure).

Rule refresh is useful when you want to assign different attributes to the same data set. For example, the same data set may be used for both daily and end of the week processing, with a different retention period for the data set in each case.

___ **NOTE** _____

Other tape management systems do not provide rule scheduling. Therefore, it is recommended that you not specify any basic scheduling criteria while operating CONTROL-M/Tape in Global Test mode.
_____

Retention Management (CTTRTM)

The CTTRTM CONTROL-M/Tape retention management utility should be run as part of the New Day procedure at the same time as the retention management function of the existing tape management system. The CTTRTM utility produces a Scratch report, which lists all the volumes that have expired (meaning become scratch) since the last run of this utility. This report is useful for comparing CONTROL-M/Tape and the current tape management system at your site. The scratch reports of CONTROL-M/Tape and the current tape management system should contain an identical list of scratch volumes.

—— *NOTE* ———

Inconsistencies in these reports should be investigated and corrected while in Global Test mode. For examples of inconsistencies and how they can be corrected, see "Scratch Report" on page 48.

A full scratch report, listing all scratch volumes in the Media Database, can be produced through the CTTRPT CONTROL-M/Tape utility. For more information, see the description of the CTTRPT utility in the *INCONTROL for z/OS Utilities Guide*.

Vault Management (CTTVTM)

The CTTVTM CONTROL-M/Tape vault management utility should be run as part of the New Day procedure at the same time as the vault management function of the existing tape management system. The CTTVTM utility produces a Distribution report that lists all the volumes that should be moved and the locations to which they should be moved. This report is useful for comparison between CONTROL-M/Tape and the other tape management system at your site. The information in the two reports should match.

—— *NOTE* ———

Inconsistencies in these reports should be investigated and corrected while in Global Test mode. For examples of inconsistencies and how they can be corrected, see "Distribution Report" on page 51.

When the retention and distribution reports of CONTROL-M/Tape and the other tape management system at your site are identical, CONTROL-M/Tape has been properly customized and it is time move to Global Phased mode, which is described in Chapter 3, "Global Phased Mode."

Gathering Data Set Statistics for Stacking (CTTSTK)

The CTTSTK Stacking Statistics utility collects information about the size of past versions of data sets, as well as the average life span for data sets that have non-specific retention (meaning, retention types CYCLES, CATALOG and LAST ACCESS). This information is used by the Dynamic Data Set Stacking facility to calculate the amount of space needed for each data set. When the CTTSTK utility is run, information is collected about each data set that was created since the last run of the utility.

Although the Dynamic Data Set Stacking facility is normally not active during Global Test mode, you can use this test period for collecting data set information (through the CTTSTK utility). Data set statistics collected at this stage is used when the Dynamic Data Set Stacking facility is implemented. The CTTSTK utility does not interfere with production, but it does take time. If you plan to utilize the Dynamic Data Set Stacking facility in the near future (after the transfer to Global Production mode), run the utility. Otherwise, wait until Global Production mode.

Media Database and Trace File Backup

The backup process can be performed by any backup utility (for example, DFSMSdss, DFSMShsm, or IEBGENR). The CTTTRB utility is invoked before the backup process to mark where the backup begins, and is invoked again after the backup process to mark that the backup was completed successfully.

New Day Procedure JCL

Below is a sample JCL for the CONTROL-M/Tape New Day procedure. Note the order in which the various tasks are performed. Also note that the CTTTRB job is run both before and after backup of the Media Database to indicate the start and end of the backup procedure.

Figure 4   Sample JCL for New Day Procedure

```
//I610INDY JOB  ,IOA610,MSGCLASS=X,CLASS=A
//*
//*
//*------------------------------------------------------------
//*
//*              CONTROL-M/TAPE DAILY JOB
//*------------------------------------------------------------
//*  THE BACKUP OF THE MEDIA DATABASE IS PERFORMED BY DFDSS.
//*  THIS BACKUP INCLUDES ALL THE MEDIA DATABASE EXTENTS.
//*  PLEASE CHANGE THE MEDIA DATABASE PREFIX IN SYSIN DD STATEMENT
//*  OF THE CTTBKPM STEP.
//*
//*  IN CASE YOU NEED TO RESTORE THE MEDIA DATABASE YOU HAVE
//*  TO USE DFDSS WITH RESTORE STATEMENT.
//*------------------------------------------------------------
//*
//      JCLLIB  ORDER=%ILPREFA%.PROCLIB
//      INCLUDE MEMBER=IOASET%INSTID%
//*
//*------------------------------------------------------------
//*  CHECK CONTROL-M/TAPE OPERATION MODE
//*------------------------------------------------------------
//*
//CTTCHK   EXEC CTTINIT,
//      PARM='MODE=CHECK'
//*
//*------------------------------------------------------------
//*  RELOAD CONTROL-M/TAPE RULES - THIS STEP IS OPTIONAL
//*------------------------------------------------------------
//*
//CTTINIT EXEC CTTINIT,
//      PARM='MODE=RELOAD,TBLT=RULE'
//*
//*------------------------------------------------------------
//*  CONTROL-M/TAPE RETENTION MANAGEMENT
//*------------------------------------------------------------
//*
//CTTRTM   EXEC CTTRTM,REGION=32M
//CTTRTM.SYSIN  DD *
```

```
 TYPERUN   MODE=NORMAL
 TYPERET   MODE=REGULAR
 REPORT    NAME=SCRATCH,SUMMARY=YES
 FIELDS    ROWID,VOLSER,SLNAME,MEDIA,EXPDT,LACCDT,LOCATION,POOL,
  DSNAME,EXPDS
 SORTBY    POOL/B,VOLSER
/*
//*
//*-------------------------------------------------------------
//*  CONTROL-M/TAPE VAULTING MANAGEMENT
//*-------------------------------------------------------------
//*
//CTTVTM  EXEC CTTVTM,REGION=32M
//CTTVTM.SYSIN  DD *
 TYPERUN   MODE=NORMAL
 TYPEVLT   MODE=REGULAR
 REPORT    NAME=DISTRIB,SUMMARY=YES
 FIELDS    ROWID,VOLSER,DSNAME,TOSLOT,VOLSEQ,EXPDT,LBLTYP,CREJBN,CREDT
 SORTBY    FROMLOC/B,TOLOC/B,VOLSER
 REPORT    NAME=DISTRIB,SUMMARY=YES
 FIELDS    ROWID,TOLOC,VOLSER,FROMSLOT,TOSLOT,NEXTLOC
 SORTBY    FROMLOC/B,TOLOC,VOLSER
 REPORT    NAME=DISTRIB,SUMMARY=YES
 FIELDS    ROWID,FROMLOC,VOLSER,FROMSLOT,TOSLOT,NEXTLOC
 SORTBY    TOLOC/B,FROMLOC,VOLSER
/*
//*
//*-------------------------------------------------------------
//*  UPDATE CONTROL-M/TAPE STACKING DATABASE FROM THE TRACE FILE
//*-------------------------------------------------------------
//*
//CTTSTK  EXEC CTTSTK,SMFIN=NULLFILE,REGION=5M
//CTTSTK.SYSIN  DD *
 TYPERUN MODE=TRC
/*
//*
//*-------------------------------------------------------------
//*  BACKUP CONTROL-M/TAPE MEDIA DATABASE AND TRACE FILE
//*-------------------------------------------------------------
//*
//CTTTRB1 EXEC CTTTRB,PARM='BKP=START'
//*
//CTTBKPM EXEC PGM=ADRDSSU
//SYSPRINT DD SYSOUT=*
//TAPE     DD DISP=(,KEEP),UNIT=TAPE,
//            DSN=&DBPREFT..MDBBKP
//SYSIN    DD *                <<== CHANGE CONTROL-M/TAPE MEDIA PREFIX
 DUMP DATASET(                -
    INCLUDE(CTT.V610.MDBD.E*)) -
    OUTDDNAM(TAPE)            -
    TOL(ENQF)
//*
//CTTBKPT EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD DISP=SHR,DSN=&DBPREFT..TRC
//SYSUT2   DD DISP=(,KEEP),UNIT=TAPE,
//            DSN=&DBPREFT..TRCBKP
//SYSIN    DD DUMMY
//*
//CTTTRB2 EXEC CTTTRB,PARM='BKP=END'
//*
//*-------------------------------------------------------------
```

```
//*   ANALYZE THE MEDIA DATABASE
//*------------------------------------------------------------
//*
//CTTIDB   EXEC CTTIDB
//SYSIN    DD *
 TYPERUN MODE=UPDATE,USEDAYS=7
//*
//*------------------------------------------------------------
//*   ISSUE WARNING IF CTTDAY DID NOT FINISH SUCCESSFULLY
//*------------------------------------------------------------
//*
//   IF (CTTVTM.CTTVTM.RC >= 8                        OR
//       CTTRTM.CTTRTM.RC >= 8                        OR
//       CTTSTK.CTTSTK.RC >= 8                        OR
//       CTTIDB.CTTIDB.RC >= 8                        OR
//       CTTINIT.CTTINIT.RC >= 8                      OR
//       CTTBKPM.RC >= 8                              OR
//       CTTBKPT.RC >= 8                              OR
//       ABEND)  THEN
//WARNING  EXEC PGM=CTM35F
//         INCLUDE MEMBER=&IOAENV
//SYSPRINT DD SYSOUT=*
//DA35F    DD DISP=SHR,
//     DSN=&OLPREFT..PARM(WARNDAY)
//   ENDIF
//*------------------------------------------------------------
//*
//
```

External Data Managers

CONTROL-M/Tape supports various External Data Managers (EDMs) such as DFSMShsm. These managers each have their own method of naming and tracking their data sets and volumes. CONTROL-M/Tape allows the EDM to manage and expire EDM-controlled volumes, while CONTROL-M/Tape tracks activity and supervises access of these volumes. EDM volumes are identified to CONTROL-M/Tape through DO RETENTION=EDM statements in CONTROL-M/Tape rule definitions.

BMC Software recommends that you implement the CONTROL-M/Tape interface to the EDM in use at your site while operating CONTROL-M/Tape in Global Test mode. The EDM interface enables CONTROL-M/Tape to detect when the EDM scratches a tape, so that CONTROL-M/Tape can update the Media Database accordingly. For more information on EDM interface implementation, see Chapter 7, "External Data Managers."

Restart Management Interface

If the other tape management system at your site has an interface to a restart management product (for example, CONTROL-M/Restart,) the CONTROL-M/Tape interface to this product should be implemented as well. For more information, see the *INCONTROL for z/OS Administrator Guide.*

DFSMS Implementation

If the DFSMS System Managed Tape feature is used to manage tape data sets at your site, the CONTROL-M/Tape interface to DFSMS should be implemented before CONTROL-M/Tape is activated in Global Test mode. For information on how to implement this interface, see Chapter 10, "CONTROL-M/Tape DFSMS Interface."

CONTROL-M/Tape Reports

CONTROL-M/Tape reports are produced through the CTTRTM, CTTVTM and CTTRPT utilities. Customize CONTROL-M/Tape reports in a format similar to the reports of the other tape management system at your site. This makes it easier for you to compare reports and make necessary adjustments to tape management definitions. For information on how to customize the format of CONTROL-M/Tape reports, see the descriptions of these utilities in the *INCONTROL for z/OS Utilities Guide.*

The CTTRTM utility produces a Scratch report listing all volumes that were expired (meaning, became scratch) as a result of the run of the utility. Figure 5 shows a sample of the default format for this report.

Figure 5   Sample Scratch Report

```
BMC SOFTWARE, INC. CONTROL-M/TAPE REPORT (VER 6.1.00)   DATE 08/08/2000 TIME 15.13    PAGE 1
                                        List of Scratched Volumes
                                        -------------------------
Pool Name:  $$NOPOOL

ROWID   VOLSER  SL-Name Media     Expiration  Last      Location  Dataset           Dataset
                                  Date        Access              Name              Expiration
-----   ------  ------  --------  ----------  --------  --------  ----------------  ----------

1       MOM001  MOM001  CART      08/08/00    10/11/99  MAINLIB   N60.TEST.DS       Catalog
2       MOM002  MOM002  CART      08/08/00    10/11/99  MAINLIB   N60.TEST.DS       Catalog
3       CC0001  CC0001  CART      08/08/00    11/11/99  MAINLIB   N60.CYCLDS        Cycl+001
4       CC0002  CC0002  CART      08/08/00    11/11/99  MAINLIB   N60.CYCLDS        Cycl+001
5       NLTAP1  NLTAP1  CART      08/08/00    11/11/99  MAINLIB   N60.TEST.DS1      08/08/00
6       NLTAP2  NLTAP2  CART      08/08/00    11/11/99  MAINLIB   N60.TEST.DS2      08/08/00
7       NL0001  NL0001  CART      08/08/00    11/11/99  MAINLIB   N60.TEST.DSX      08/08/00
Total In $$NOPOOL       :       7
```

The CTTVTM utility produces a Distribution report. It lists all volumes that should be moved to a new location or assigned a new slot number. Figure 6 shows a sample of the default format for this report.

Figure 6   Sample Distribution Report

```
BMC SOFTWARE INC. CONTROL-M/TAPE REPORT (VER 6.1.00)    DATE 08/08/2000 TIME 15.59    PAGE 1
                                             Distribution Report
                                             -------------------
From Location:  MAINLIB    To Location:  VTLA

ROWID VOLSER  Data Set Name             To     Volume    Expiration   Label  Create    Create
                                        Slot   Seq. No.  Date         Type   Job       Date
----- ------  ------------------------- ------ --------  ----------   -----  --------  --------
1     D00001  N60.D01.ARCHIVE.G0194V00 2       1         Catalog      SL     PRARC015  07/07/00
2     X00001  N60.D01.ARCHIVE.G0213V00 1       1         Catalog      SL     PRARC017  07/07/00
3     V00001  N60.V01.ARCHIVE.G0210V00 3       1         Catalog      SL     PRARC022  07/07/00
4     V00002  N60.V02.ARCHIVE.G0211V00 4       1         Catalog      SL     PRARC023  07/07/00
5     V00003  N60.V03.ARCHIVE.G0198V00 5       1         Catalog      SL     PRARC019  07/07/00

Total In VTLA    :
Total In MAINLIB :       5
```

The CTTRPT utility is a general reporting utility that produces reports based on information in the Media Database. A wide variety of sample reports is provided with this utility. Additional report formats can be generated by manipulating the parameters of this utility.

Use this utility to produce reports that are similar to the reports produced by your existing tape management system (in addition to the Scratch and Distribution reports described in the preceding samples).

Operating in Test Mode

After the preparations described above, convert tape management data at your site and activate CONTROL-M/Tape in Global Test mode. (Conversion of tape management data is described in detail in the *CONTROL-M/Tape Conversion Guide.*)

Both CONTROL-M/Tape and the other tape management system should be started at the same time after the conversion process. The objective of Global Test mode is to ensure that CONTROL-M/Tape operates in the same way as your existing tape management system and that the CONTROL-M/Tape Media Database and the database of the other tape management system are synchronized.

Start CONTROL-M/Tape in Global Test Mode

Make sure that the MODET parameter is set to TEST in the CTTPARM member in the IOA PARM library.

Start CONTROL-M/Tape using the following command:

```
S CTTINIT,PARM=INIT
```

Monitor Tape Management Reports

Monitor tape management database synchronization in the following ways:

Compare the reports generated by the retention and vault management facilities of CONTROL-M/Tape and the other tape management system.

Scan the system log and job log for messages that indicate that CONTROL-M/Tape did not agree with an action performed by the existing tape management system.

Synchronization of the CONTROL-M/Tape Media Database with the existing tape management system's database is monitored primarily through the Scratch and Distribution reports. These reports are produced by the daily maintenance procedures of CONTROL-M/Tape and the other tape management system. The reports should be produced by both tape management systems at the same time and have identical information. Below is a description of each report and sample problems that can be detected through inconsistencies in these reports.

> **— NOTE —**
> Synchronization of the tape management database can also be affected by integrity problems in the Media Database. These problems can result from a system crash or a utility abend. The CTTIDB utility is run as part of the CONTROL-M/Tape New Day procedure to verify integrity of the Media Database. For information about Media Database integrity errors, see Chapter 5, "Verifying Media Database Integrity."

Scratch Report

The Scratch report lists all volumes that were expired (meaning, became scratch) during the most recent run of the CTTRTM utility. There should be the same number of scratch volumes on the Scratch report as on the equivalent report produced by the existing tape management system.

An inconsistency in a global definition (for example, default retention) can cause a large number of inconsistencies. Therefore, appropriate settings for global parameters should be given a high priority.

You can determine if a problem is due to a global definition by comparing retention definitions of a data set or volume that was treated differently by CONTROL-M/Tape and the other tape management system.

If the retention definitions are the same, the problem may be due to a global definition. In this case verify that the following CONTROL-M/Tape installation parameters were assigned the appropriate values:

- CTLGWAIT
- EXPDTDDN
- RTNTYPE
- CYCLECNT
- EXPDTYPE
- RTNUPD
- DEFEXPDT
- OVERJCL
- GRACECAT
- GRACECYC
- EXPCAT

Resolving Retention Discrepancies

The following table describes sample discrepancies that may be discovered when comparing Scratch reports of CONTROL-M/Tape and the other tape management system:

Table 5   Retention Discrepancies and Resolutions (part 1 of 2)

Symptom	Probable Causes	Resolution
A data set was expired in CONTROL-M/Tape but not in the other tape management system.	The data set has a retention rule in the other tape management systems but not in CONTROL-M/Tape. CONTROL-M/Tape retention defaulted to the value of the DEFEXPDT parameter in the CTTPARM member. A retention rule may have been created in the other tape management system after conversion.	Reconvert retention rules or define a CONTROL-M/Tape rule that specifies the same retention as defined for this data set in the other tape management system.
A data set was expired in both tape management systems but on different days.	No retention was defined for this data set in either tape management systems and CONTROL-M/Tape default retention (the DEFEXPDT parameter) is not equal to the default retention setting of the other tape management system.	Specify the appropriate value for the DEFEXPDT parameter in the CTTPARM member.
	The specification for when retention is updated in CONTROL-M/Tape (the RTNUPD parameter) is not compatible with the behavior of the other tape management system.	Specify a value for RTNUPD that is consistent with the setting in the other tape management system.
A data set created by an EDM was automatically expired in CONTROL-M/Tape before the EDM expired it.	CONTROL-M/Tape does not recognize this data set as an EDM data set, because there is no rule defined in CONTROL-M/Tape that specifies the DO RETENTION=EDM statement for this data set.	Adjust CONTROL-M/Tape rules accordingly.
Data set retention was set to CYCLE 003 but five cycles exist and none of them have been expired.	The CYCLECNT parameter was not set to NONE in the CTTPARM member.	Set CYCLECNT to NONE in the CTTPARM member.
A data set with cyclic retention did not expire or expired sooner than expected.	The PREFIX subparameter in the DO RETENTION=CYCLE statement of the rule for this data set is inconsistent with the relevant setting of the other tape management system.	Specify the correct value for the PREFIX subparameter.

Table 5   Retention Discrepancies and Resolutions (part 2 of 2)

Symptom	Probable Causes	Resolution
A data set with CATALOG controlled retention was expired by the existing tape management system but not by CONTROL-M/Tape.	The value specified for the CTLGWAIT parameter is not consistent with the existing tape management system.	Specify the correct setting for the CTLGWAIT installation parameter in the CTTPARM member.
Multiple data sets (with DATE or DAYS retention) are expired by CONTROL-M/Tape one day earlier than by the other tape management system.	The value specified for the EXPDTYPE parameter is not consistent with the existing tape management system.	If the existing tape management system is CA-TLMS, make sure that EXPDTYPE is set to TLMS in the CTTPARM member. For all other tape management systems, set EXPDTYPE to CA1.
Data sets stored on multi-file volumes were scratched by CONTROL-M/Tape before they were scratched by the other tape management system.	The RTNTYPE parameter may have been set to DSN. As a result, CONTROL-M/Tape expires each data set on the volume according to its own retention criteria. This setting is not compatible with other tape management systems.	Set RTNTYPE to VOL in the CTTPARM member.
A data set was expired in the other tape management system but was not expired in CONTROL-M/Tape. -and- The volume is marked as "VAULTED" in CONTROL-M/Tape.	CONTROL-M/Tape only expires a data set if it is stored on a volume in MAINLIB (meaning, the active library). If the volume was vaulted when the data set expired, the other tape management system may have scratched the data set. (CONTROL-M/Tape expires the volume only when it is returned to MAINLIB.)	Check the retention period and vaulting pattern of the data set. Modify the CONTROL-M/Tape rule definition for this data set so that the retention period is not less than the vault retention period.
Data sets to be returned to the active library today were expired by the other tape management system, but not by CONTROL-M/Tape.	Retention management was performed before vault management in CONTROL-M/Tape and in the opposite order by the other tape management system.	Modify the CONTROL-M/Tape New Day procedure to ensure that CONTROL-M/Tape and the other tape management system perform these functions in the same order.

Distribution Report

The Distribution report is produced by the Vault Management facility (the CTTVTM utility). This report describes all volume movements between the active library (MAINLIB) and an external library, and between different external libraries.

The Distribution report lists all volumes that should be moved to a new location or assigned a new slot number. The CTTVTM utility checks each volume record's vault specifications in the Media Database and determines which volumes should be moved to a new location according to their vault patterns. The current vault location

in the volume record is updated and the new location for the volume is listed in the Distribution report. The information in the CONTROL-M/Tape distribution report should contain the same information as the equivalent report produced by the existing tape management system.

An inconsistency in a global definition (for example, default retention) may be responsible for a large number of inconsistencies. Therefore, fixing global parameter settings should be given a high priority.

You can determine if a problem is due to a global definition by comparing vaulting patterns of a volume that was treated differently by CONTROL-M/Tape and the other tape management system.

If the vaulting patterns are the same, the problem could be due to a global definition. In this case, verify that the following installation parameters have been properly defined:

- CYCLECNT
- VLTBYDS1

Resolving Vaulting Discrepancies

The following table describes sample discrepancies that may be discovered when comparing the distribution reports of CONTROL-M/Tape and the other tape management system:

Table 6   Vaulting Discrepancies and Resolutions (part 1 of 2)

Symptom	Probable Causes	Resolution
The distribution report of the other tape management system indicates that a volume should be moved, but the CONTROL-M/Tape distribution report does not indicate this.	A vault pattern was defined for the volume in the other tape management system after tape management data was converted to CONTROL-M/Tape format.	Create a CONTROL-M/Tape rule definition that includes the appropriate DO VAULT statements for this volume or the vaulting data set of this volume.
CONTROL-M/Tape and the other tape management system specify inconsistent vaulting instructions.	The value specified for the VLTBYDS1 parameter is not consistent with the existing tape management system.	Specify the correct setting for installation the VLTBYDS1 parameter in the CTTPARM member.
A data set with a cyclic vaulting pattern was either not moved, or was moved sooner than expected.	The PREFIX subparameter in the DO VAULT=UNTIL CYCLES statement of the rule for this data set is inconsistent with the relevant setting of the other tape management system.	Specify the correct value for the PREFIX subparameter.

Table 6   Vaulting Discrepancies and Resolutions (part 2 of 2)

Symptom	Probable Causes	Resolution
The vaulting pattern of a data set was set to CYCLE 003 but five cycles exist and none of them have been moved.	The CYCLECNT parameter was not set to NONE in the CTTPARM member.	Set CYCLECNT to NONE in the CTTPARM member.
CONTROL-M/Tape and the other tape management system indicate different slot numbers for specific volumes.	CONTROL-M/Tape and the other tape management system are using different algorithms to determine the next slot to be filled.	Make sure that actual vaulting is performed according to the specifications of the existing tape management system's distribution report (meaning, not according to the CONTROL-M/Tape distribution report). This inconsistency is corrected when tape management data is reconverted before CONTROL-M/Tape is activated in Global Phased mode, which is described in Chapter 3, "Global Phased Mode."

Monitor System and Job Log Messages

During Global Test mode, CONTROL-M/Tape sends messages to the System log, Job log, or operator console if there is a contradiction between the existing tape management system's actions and the actions CONTROL-M/Tape would take if it were operating in Global Production mode. These messages can help you resolve inconsistencies found during comparison of scratch and distribution reports, and provide useful information on data integrity problems detected by the CTTIDB utility. For more information about this utility, see Chapter 5, "Verifying Media Database Integrity."

Most of these System and Job log messages are followed by message CTT146I.

```
CTT146I  JOB CONTINUES DUE TO TEST MODE
```

If CONTROL-M/Tape were operating in Global Production mode, the job executing when the message was issued would be abended or the scratch tape would be rejected by CONTROL-M/Tape. In Global Test mode, the job continues processing under the control of the existing tape management system. When the CTT146I message is sent to the log, CONTROL-M/Tape bypasses the rest of the job and ignores all subsequent information produced by the job. This may result in additional inconsistencies between the existing tape management system and CONTROL-M/Tape.

The following pages contain sample CONTROL-M/Tape messages that may be sent to the System log or Job log as a result of an inconsistency with the existing tape management system. For each of these messages, it is important to investigate why the CONTROL-M/Tape Media Database does not have the same information as the existing tape management system's database. Be sure to check relevant earlier messages for a possible cause for the problem.

Potential Conflicts

Problem 1 – File Sequence Error

```
CTT107E 0123, FILES WITH HIGHER SEQUENCE NUMBERS EXIST ON VOLUME V00001 (OUTFILE,002)
```

A file was written on volume V00001, mounted on tape drive 0123, with sequence number 002 and a data set with a higher sequence number exists on that volume according to the information in the CONTROL-M/Tape Media Database.

According to CONTROL-M/Tape at least two data sets are already stored on this volume (V00001).

Since the other tape management system allowed this action, it apparently has no record of two or more data sets on this volume.

Problem 2 – Missing Previous File

```
CTT108E   0123, PREVIOUS FILE DOES NOT EXIST ON VOLUME VV0002 (OUTFILE,003)
```

A file with a specified sequence number (003) was written on volume VV0002, which is mounted on tape drive 0123, but no file with the preceding sequence number exists on the volume according to the CONTROL-M/Tape Media Database.

CONTROL-M/Tape requires file sequence numbers on a volume to be consecutive.

A data set with sequence number 002 would need to exist on this volume for CONTROL-M/Tape to allow writing of a file with sequence number 003. According to CONTROL-M/Tape, either one or no files exist on this volume.

Problem 3 – Data Set Name Conflict

```
CTT109E   0123, DSNAME CONFLICTS WITH MDB DSNAME: DSN.VVV03 (INFILE,002)
```

An attempt was made to read a data set (specified in the JCL) with label 002 on a specific volume, and CONTROL-M/Tape has no record of this data set on the specified volume. The specified volume contains data set DSN.VVV003 (meaning, not the requested data set) with the specified label number.

Problem 4 – Data Set Not Found

```
CTT110E   0123, DATA SET NOT FOUND IN MDB:  DSN.D0004 (INFILE)
```

A data set that is not found in the CONTROL-M/Tape Media Database was read.

This message is issued only if the dynamic data set definition is not allowed (that is, DYNDS is set to N in the CTTPARM member).

The data set was either not converted from the existing tape management system, or it was added manually to the existing tape management system's database and not to the CONTROL-M/Tape Media Database.

During Global Test mode, make sure data sets are added consistently to the databases of both CONTROL-M/Tape and the other tape management system. In Global Production mode, this error should not occur if DYNDS is set to Y in the CTTPARM member (that is, if the dynamic data set definition is activated).

Problem 5 – File Already Exists

```
CTT118E 0123, FILE ALREADY EXISTS: DSN.D0005 (OUTFILE)
```

An existing data set may have been overwritten.

The other tape management system allowed a data set to be written on the tape but, according to CONTROL-M/Tape, the specified data set already existed on this tape and was overwritten.

Problem 6 – Non-Scratch Volume Mount

```
CTT125E 0123, V00006, NOT A SCRATCH VOLUME
```

A scratch tape was requested on the specified drive (0123). The tape supplied in response to this request (volume V00006) is not marked as scratch in the CONTROL-M/Tape Media Database.

After a volume is mounted in response to a scratch request, CONTROL-M/Tape verifies that the mounted volume is a scratch volume.

If such an error was detected while CONTROL-M/Tape was operating in Global Production mode, the specified volume would be rejected and another volume requested.

Volume and data set information for this volume is not updated in the CONTROL-M/Tape Media Database. This may result in additional problems.

Problem 7 – EDM-Controlled Volume

```
CTT133E   0123, NON-EDM TRYING TO WRITE ON AN EDM VOLUME V00008
```

A job that is not an EDM (External Data Manager) wrote to a volume (V00008) that is marked as an EDM volume according to CONTROL-M/Tape. The new information on this volume and the data sets it contains are not recorded in the CONTROL-M/Tape Media Database. This results in discrepancies on the output reports.

If CONTROL-M/Tape were operating in Global Production mode, the job would be abended. In CONTROL-M/Tape, volumes marked as EDM-controlled can only be accessed by the EDM.

When an EDM marks a volume as Scratch, that volume is no longer considered "EDM-controlled" by CONTROL-M/Tape.

Problem 8 – Recreated Data Set on the Wrong Volume

```
CTT141E   0123, RECREATE ON WRONG VOLUME  VV0009
```

A data set was recreated on the specified volume (VV0009).

According to CONTROL-M/Tape, this data set already existed on the volume, but the data set does not start on that volume. CONTROL-M/Tape allows an existing data set to be overwritten only if the data set begins on the same volumes. Use the CONTROL-M/Tape Inquire/Update screen to view the volume and data set information. For more information on conditions necessary for data set recreation, see the organization and administration chapter of the *CONTROL-M/Tape User Guide.*

Assume, for this example, that volume VV0009 is the second volume of a multi-volume chain containing data set DSN.D0009. CONTROL-M/Tape can only recreate data set DSN.D0009 starting from the first volume of the multi-volume chain. In Global Production mode, the job would abend.

Since the existing tape management system recreated this file starting on volume VV0009, the two databases are apparently not synchronized for either the data set or the volumes in the multi-volume chain.

Conflict Resolution

All of the above problems could be the result of one of the following:

The previous TMS expired tapes faster than CONTROL-M/Tape.

The previous TMS allowed a job to proceed. However, the allowed job did not conform to CONTROL-M/Tape rules.

A different retention was assigned to data sets by the two TMSs.

To resolve these problems:

1 Examine the relevant volume record in the CONTROL-M/Tape Media Database, and in the parallel information in the other Tape Management System's database. Examine previous messages in the system or job log to determine what problem may have caused this error.

2 Use the Online facility or the CTTMUP utility to make necessary correction in the CONTROL-M/Tape Media Database.

3

Global Phased Mode

This chapter includes the following topics:

Overview

Global Phased mode is used when you are reasonably certain that CONTROL-M/Tape is functioning like the other tape management system. As a safety feature, this mode enables both CONTROL-M/Tape and the other tape management system to be fully operational simultaneously.

Previously (in Global Test mode) CONTROL-M/Tape operated in the background (meaning, it had no effect on production). In Global Phased mode, only operations that are allowed by both CONTROL-M/Tape and the other tape management system are performed. Operations not consistent with either CONTROL-M/Tape or the other tape management system are not performed and relevant messages are sent to the console or job log.

—— **NOTE** ————————————————————————————————————

Media management features that do not affect compatibility of operations with the other tape management system should be tested in Global Phased mode.

Changes that do affect compatibility (for example, CONTROL-M/Tape duplicate volser support) should not be implemented while CONTROL-M/Tape is operating in Global Phased mode.

Most of this chapter deals with preparation for the transfer of CONTROL-M/Tape operations to Global Phased mode. The object of these preparations is to minimize discrepancies between the CONTROL-M/Tape and the other tape management system. Features that do not affect compatibility (for example, alteration of MOUNT and KEEP messages) should be activated with the change to Global Phased mode. Advanced CONTROL-M/Tape features (for example, Dynamic Data Set Stacking) should not be implemented until the transfer to Global Production mode.

Preparation

Installation Parameter Considerations

Most CONTROL-M/Tape installation parameters (in the CTTPARM member) were set prior to activation of CONTROL-M/Tape in Global Test mode. However, values specified for some of these parameters, listed in the following table, should be reconsidered before activation of CONTROL-M/Tape in Global Phased mode.

For a more detailed description of these parameters, see the CONTROL-M/Tape installation chapter in the *INCONTROL for z/OS Installation Guide*.

Table 7   CONTROL-M/Tape Installation Parameters (part 1 of 2)

Parameter	Description
CNGMSGID	Determines whether to modify IDs of MOUNT and/or KEEP messages. If any software products at your site reference the current message ID, you should update those products (for example, console automation products or automated tape libraries). Changing a message ID using this parameter can be useful for verifying that CONTROL-M/Tape is active.
DYNWTO	Determines whether to modify the text of MOUNT and/or KEEP messages (for example, to add the scratch pool name to mount messages). The MSGFMT parameter specifies the information that can be added to these messages.
LBLROUTC	Route code to the tape label printer. To test CONTROL-M/Tape's label printing capability, specify the route code that has been assigned to the console printer at your site. To view the labels without actually printing them, specify a route code other than the route code of your current label printer. This causes the label information to be sent to the console. Below is a sample label as it would appear on the console: ``` +----+----1----+----2----+----3----+----4 | DSN: MY.DATASET | | EXPDT: 07/06/2001 | | VOLSER: 123450 SLNAM: 123450 | | BLKSIZE: 03120 LRECL: 00080 | | CDATE: 05/05/2000 CTIME: 11:30 | | CJOB: PRCOPY04 CUNIT: 0480 | +----+----1----+----2----+----3----+----4 ``` CONTROL-M/Tape Exit 9 can be used to customize the format of tape label information. Exit 9 can also be used to direct tape labels to a sysout file that can be printed on any printer. For information about how to use this exit, see the CTTX009 member in the IOA SAMPEXIT library.
MODET	CONTROL-M/Tape operation mode. To indicate that CONTROL-M/Tape should operate in Global Phased mode, set MODET to PHASED.
MSGFMT	Information to be added to MOUNT and/or KEEP messages. Verify that the setting for this parameter suits the needs of your site.
NLASKOP	Specifies whether CONTROL-M/Tape should ask the operator to confirm the volume serial numbers (volsers) of the NL and BLP tapes.
	Note: While operating in Global Test mode, CONTROL-M/Tape treats the expression NLASKOP=Y the same way as NLASKOP=N. In Global Phased mode, this parameter can affect tape processing, and therefore should be reconsidered.

Table 7   CONTROL-M/Tape Installation Parameters (part 2 of 2)

Parameter	Description
RBTTYPE	Automated tape libraries to be used. Only one system (either CONTROL-M/Tape or the other tape management system) should manage the interface to the automated tape library. ■ If CONTROL-M/Tape is to manage the automated tape library interface, specify the automated tape library types. ■ If the other tape management system is to manage the automated tape library interface, set this parameter to NONE.
TESTRULE	Specifies whether CONTROL-M/Tape rules should be checked to see if they should be executed in Test mode when the Global operation mode is PHASED or PROD. BMC Software recommends that you set the MODE parameter to PROD in all CONTROL-M/Tape rule definitions. If MODE is set to TEST in a rule definition, the rule does not intervene in the decisions made by the existing tape management system, but it may update the Media Database. Therefore, you should also set TESTRULE to N.
	Note: Setting TESTRULE to Y may affect performance time of CONTROL-M/Tape tasks, even if MODE is not set to TEST in any CONTROL-M/Tape rules.

Reestablish Procedures

The CONTROL-M/Tape New Day procedure (CTTDAY) performs various maintenance activities. Some of these activities (for example, statistics collection) may not have been relevant to CONTROL-M/Tape in Global Test mode. If you commented out JCL steps for operation in Global Test mode, it is now necessary to remove the comment indicators (//*) so that these steps become operational in Global Phased mode.

Ensure that the CONTROL-M/Tape New Day procedure is run at exactly the same time as the daily procedure of the other tape management system. Simultaneous generation of the reports by CONTROL-M/Tape and the other tape management system helps guarantee that the information in those reports is consistent (meaning, both sets of reports represent the same media disposition).

Security Implementation

Before CONTROL-M/Tape is started in PHASED mode, security definitions (for example, who is allowed to update CONTROL-M/Tape rules, and who has access to the Online facility) should be specified.

CONTROL-M/Tape security is implemented in two stages:

1 Customize the CONTROL-M/Tape interface with your security product. Detailed information on this stage is provided in the *INCONTROL for z/OS Security Guide.*

2 Modify the CONTROL-M/Tape Security exits so that they are compatible with your site configuration. The following CONTROL-M/Tape security exits are provided:

Table 8   CONTROL-M/Tape Security Exits

Exit	Description
CTTSE01	Checks authorization for ordering CONTROL-M/Tape rules. This exit also checks if a user is authorized to activate procedure CTTINIT (used for CONTROL-M/Tape initialization).
CTTSE03	Checks authorization for file open requests and JCL parameters BLP and EXPDT=98000.
CTTSE04	Checks authorization for dynamic definition of volumes (tapes) and data sets in the Media Database.
CTTSE06	Checks authorization to update the Media Database through an online screen or a CONTROL-M/Tape utility.
CTTSE09	Checks authorization to print a tape label.

For more information on CONTROL-M/Tape security implementation, see the CONTROL-M/Tape chapter in the *INCONTROL for z/OS Security Guide.*

Automated Tape Library Interfaces

An interface to the automated tape library at your site is typically initialized during Global Phased mode. Only one tape management system should control the automated tape library at any one time. For information about how to implement a CONTROL-M/Tape automated tape library interface, see Chapter 8, "Automated Tape Library Interface and Virtual Tape Server."

Operating in Global Phased Mode

When the steps described above in "Preparation" have been completed, it is time to activate CONTROL-M/Tape in Global Phased mode.

■ If CONTROL-M/Tape is already active and the Media Database is properly synchronized with the database of the other tape management system, you can simply change the value of the MODET parameter in the CTTPARM member and reload it. However, it is highly recommended that you reconvert tape management information from the other tape management system before activating CONTROL-M/Tape in Global Phased mode.

■ If the CONTROL-M/Tape Media Database is not synchronized and rules and parameters have been adjusted, reconvert the Media Database before activating CONTROL-M/Tape in Global Phased mode.

Both tape management systems must be brought down (deactivated) before conversion is performed. For more information on the conversion of tape management, see the *CONTROL-M/Tape Conversion Guide.*

Monitor Synchronization of Tape Management Databases

Before activating CONTROL-M/Tape in Global Phased mode, the Media Database should already be synchronized with the database of the other tape management system. However, while in Global Phased mode, it is important to continue to monitor the Media Database to check that the information it contains is still consistent with the database of the tape management system being replaced by CONTROL-M/Tape.

Media Database synchronization can be accomplished in a number of different ways.

Reports generated from the tape management system databases are compared (for example, scratch volume, and volume distribution information).

System and job log messages are monitored for messages regarding disagreement between CONTROL-M/Tape and the other tape management system.

— *NOTE* ———
Synchronization of tape management database may also be affected by integrity problems in the Media Database. These problems can result from a system crash or a utility abend. The CTTIDB utility is run as part of the CONTROL-M/Tape New Day procedure to verify integrity of the Media Database. For information about Media Database integrity errors, see Chapter 5, "Verifying Media Database Integrity."

Global Production Mode

This chapter includes the following topics:

Overview

When all CONTROL-M/Tape operations are synchronized with the other tape management system at your site, it is time to activate CONTROL-M/Tape in Global Production mode.

In Global Production mode:

■ You can implement CONTROL-M/Tape features whose implementation was delayed because of incompatibility with the other tape management system.

■ Existing tape management definitions (for example, CONTROL-M/Tape rules) can be modified in ways that take full advantage of CONTROL-M/Tape's capabilities.

Preparation

Removal of the Old Tape Management System

Before CONTROL-M/Tape is activated in Global Production mode, the other tape management system must be removed from your system.

All system hooks relevant to the tape management system being replaced by CONTROL-M/Tape must be removed.

■ If the hooks were installed through SMP/e, restore all relevant SYSMODs.

■ If the other tape management system was not installed through SMP/e (for example, if system hooks were inserted by zaps), restore the original MVS modules.

■ If the other tape management system uses dynamic hooks, deactivate the hooks.

When all modifications (hooks) of the old tape management system have been removed, IPL your system with option CLPA.

Installation Parameters

Most CONTROL-M/Tape installation parameters (in the CTTPARM member) were set prior to activation of CONTROL-M/Tape in Global Test mode or Global Phased mode. However, values specified for some of these parameters (listed below) should be reconsidered before activation of CONTROL-M/Tape in Global Production mode.

Table 9   Installation Parameters

Parameter	Description
MODET	CONTROL-M/Tape operation mode. Set MODET to PROD to indicate that CONTROL-M/Tape should operate in Global Production mode.
DYNVOL	Indicates what CONTROL-M/Tape should do when a job attempts to access a volume that is not in the Media Database.
DYNDS	Indicates what CONTROL-M/Tape should do when a job attempts to access a data set that is not in the Media Database.
NLASKOP	Indicates whether the operator should be asked to confirm volume serial numbers for NL (No Label) and BLP (Bypass Label Processing) tapes.
TESTRULE	Indicates whether to check if MODE is set to TEST in CONTROL-M/Tape rules (meaning, to determine if these rules should be executed in TEST mode. If N (No) is specified, the mode indicated in the rule is ignored and all rules are executed in the Global mode (specified in the CTTPARM member). It is highly recommended that N (No) be specified for this parameter.
OVERJCL[a]	Indicates whether CONTROL-M/Tape rules should override expiration dates set by MVS.

[a]   This parameter can also be set through a CONTROL-M/Tape rule.

For more information about these parameters, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Installation Guide.*

Exits

Reset the interface to the External Data Manager (EDM) at your site so that the CONTROL-M/Tape driver exit no longer calls the exit that communicates with the old tape management system at your site.

For more information about CONTROL-M/Tape EDM interfaces, see Chapter 7, "External Data Managers."

For more information about the CONTROL-M/Tape driver exit, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Administrator Guide*.

Establishing Procedures

Standard operating procedures at your site should be documented and distributed to the appropriate operating personnel. Include routine maintenance procedures with which your staff should be familiar. Below is a description of the relevant procedures and the type of information that should be provided.

CTTINIT

Procedure CTTINIT controls initialization, operation, and termination of CONTROL-M/Tape. The following command is used to activate this procedure:

```
S CTTINIT,PARM='[MODE=xxxxxx[,TBLT=xxxxx]
[,DBGLEVEL=nnn,DBGJOB=xxxxxxxx]'
```

> — **NOTE** —
> The MODE keyword can be omitted. For example, the expression PARM='MODE=INIT' is equivalent to the expression PARM=INIT.

The DBGLEVEL and DBGJOB parameters are used to generate debug messages. Use only as instructed by BMC Software Customer Support. To stop debug messages, use the expression DBDLEVEL=0.

The following table describes the valid values for MODE:

Table 10 MODE Values (part 1 of 2)

Value	Description
CHECK	Checks if CONTROL-M/Tape is active. CONTROL-M/Tape has no address space. This parameter is therefore necessary if you need to determine if CONTROL-M/Tape is currently active. A message describing current CONTROL-M/Tape status is issued in response to this command.
INIT	Initializes CONTROL-M/Tape. CONTROL-M/Tape should be started with this parameter after each IPL. Since CONTROL-M/Tape should be started automatically at IPL, it is important that this procedure be specified in the COMMND*xx* member in the SYS1.PARMLIB library.

Table 10   MODE Values (part 2 of 2)

Value	Description
RELOAD,TBLT=POOL	Reloads CONTROL-M/Tape pool definitions. CONTROL-M/Tape reads the pool definitions from the location referenced by the DAPOOLS DD statement in procedure CTTINIT. This parameter is relevant only if CONTROL-M/Tape pool definitions have been changed or added.
RELOAD,TBLT=RULE	Reloads CONTROL-M/Tape rules. CONTROL-M/Tape reads the rule definitions from the location referenced by the DARULLST DD statement in procedure CTTINIT (default: RULLIST in the CONTROL-M/Tape PARM library). This parameter is relevant only if CONTROL-M/Tape rules have been changed or added.
RELOAD,TBLT=VAULT	Reloads CONTROL-M/Tape vault definitions. CONTROL-M/Tape reads the vault definitions from the location referenced by the DAVLTS DD statement in procedure CTTINIT. This parameter is relevant only if CONTROL-M/Tape vault definitions have been changed or added.
RELOAD,TBLT=VIEW	Reloads the default and optional views for the display commands that can be issued at the MVS console. CONTROL-M/Tape reads the view definitions from the location referenced by the DATVIEWS DD statement in procedure CTTINIT. For more information on the display commands, see the organization and administration chapter of the *CONTROL-M/Tape User Guide.*
TERM	Terminates CONTROL-M/Tape. When CONTROL-M/Tape is shut down in this way, it can be restarted only using the following command: `S CTTINIT,PARM='MODE=INIT'`

CTTDAY

The CTTDAY procedure (the New Day procedure) performs routine daily maintenance. This procedure calls other procedures that perform a series of tasks at a specified time each day according to preset parameters.

Most features of the New Day procedure were already active in Global Phased mode. Two features that were probably not active before the switch to Global Production mode are the backup utilities and dynamic rule refresh.

Backup Utilities

Ensure that the utilities used to backup the Media Database and the Trace file are correctly adapted to the conditions of your site.

Dynamic Rule Refresh

CONTROL-M/Tape rules can be refreshed (reloaded) without bringing CONTROL-M/Tape down. This is normally done once a day (through the New Day procedure). Dynamic rule refresh enables you to:

- Schedule and reschedule rules each day.
- Assign different attributes to the same data set depending on calendars, day, and date specifications.

Operating Procedures

The following information about the CTTDAY procedure should be provided to the operations personnel at your site:

- What time the New Day procedure is run.

- What tasks the New Day procedure performs and what procedures and utilities it calls.

- Who is responsible for adjusting the New Day procedure.

- Who to approach if the New Day procedure abends or how to fix the procedure.

CTTTPI

The CTTTPI utility is used to initialize, map, and erase tapes. This utility also checks tape information that is relevant to CONTROL-M/Tape functioning. It is therefore recommended that you replace the IEHINITT IBM utility with the CTTTPI CONTROL-M/Tape utility.

Written specifications of how CTTTPI tasks are to be performed at your site should be distributed to all appropriate operations personnel. For more information, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide.*

Define Additional Tape Management Reports

In addition to the retention and distribution (vaulting) reports described earlier in this guide, many other reports can be generated from media management information. These reports are generally created by the CTTRPT utility from information extracted from the Media Database.

More than 30 different sample CTTRPT utility reports are provided in the IOA SAMPLE library. For more information, see the CTTRPT utility in the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide*.

KeyStroke Language (KSL)

The IOA KeyStroke Language (KSL) can be used to perform CONTROL-M/Tape operations in batch mode. KSL enables you (the user) to perform various actions without having to enter repetitive commands manually. Some sample operations that can be performed through a KSL script are:

- Mark volumes in a specified list as scratch.
- Perform immediate vaulting for a specified list of volumes.
- Perform immediate recall for a specified list of volumes.

For more information on Keystroke Language, refer to the KeyStroke LAnguage (KSL) User Guide.

— **NOTE** —————————————————————————
The same functionality (manual update of entries in the Media Database) can be achieved using the CTTMUP utility. For more information, see the CTTMUP utility in the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide*.

Operating CONTROL-M/Tape in Global Production Mode

When the steps described above in "Preparation" have been completed, CONTROL-M/Tape can be activated in Global Production mode.

If CONTROL-M/Tape is already active and the CONTROL-M/Tape Media Database is properly synchronized with the database of the other tape management system, you can simply change the value of the MODET parameter in the CTTPARM member and reload it.

However, it is highly recommended that you reconvert information from the other tape management system at your site before activating CONTROL-M/Tape in Global Production mode.

For more information about conversion of tape management data, see the *CONTROL-M/Tape Conversion Guide.*

It is recommended that you run CONTROL-M/Tape in a way consistent with the old tape management system for two or three weeks before implementing advanced CONTROL-M/Tape features.

Verifying Media Database Integrity

This chapter includes the following topics:

Overview

Inconsistencies in the Media Database may result from conversion of corrupted data in the existing tape management system's database, or from a system crash, utility abend, and so on.

To check the integrity of the Media Database, run CONTROL-M/Tape utility CTTIDB. This utility produces warning messages if inconsistencies are detected in the Media Database. Once CONTROL-M/Tape is operational at your site, the CTTIDB utility is normally run as part of the CONTROL-M/Tape New Day procedure to verify Media Database integrity.

Examples of inconsistencies are:

- errors in the links that connect multi-volume data sets (normally a result of conversion)

- active volumes that do not contain data sets

- scratch volumes that contain active data sets

- inconsistencies in the Media Database can be corrected through the CONTROL-M/Tape Inquire/Update screen (TI), or through Media Database update the CTTMUP utility

Sample CTTIDB Output

Figure 7 shows a sample output for the CTTIDB utility. The messages are issued in pairs. The first message (CTT*nnn*E) identifies the type of error detected. The second message (CTT999I) identifies the data set or volume record in error. This section provides a detailed explanation for each message in this sample and suggestions for how to resolve the problems they describe.

Figure 7   Sample Messages

```
CTT988E RBA 000101: VOLUME WITH NO DATASETS
CTT999I V PRD002 SEQ:002 FIRST:PRD001 PREV:PRD001 NEXT:PRD003
CTT990E RBA 000108: VOLSNUM (002) DIFFERS FROM # OF VOLUME RECORDS FOUND (001)
CTT999I D DSN.PRM04                                    PRM004 001
CTT983E RBA 000200: VOL: HIS001 CHAIN ERROR: INVALID PREV/NEXT POINTERS
CTT999I V HIS001 SEQ:001 FIRST:HIS001             NEXT:HIS002
CTT983E RBA 000201: VOL: HIS002 CHAIN ERROR: INVALID PREV/NEXT POINTERS
CTT999I V HIS002 SEQ:002 FIRST:HIS001
CTT983E RBA 000205: VOL: DBA003 CHAIN ERROR: VOLUME OUT OF SEQUENCE
CTT999I V DBA003 SEQ:005 FIRST:DBA001 PREV:DBA002 NEXT:DBA004
CTT987E RBA 000208: ACTIVEDS (006) DIFFERS FROM # OF DSN RECORDS FOUND (003)
CTT999I V MF0001 SEQ:000
CTT984E RBA 000303: KEY NOT FOUND. RECTYPE: D, MISSING KEY: L
CTT999I D DSN.L0006                                    L00006 001
```

Problem 1 – Active Volume With no Data Sets

```
CTT988E RBA 000101: VOLUME WITH NO DATASETS
CTT999IV PRD002 SEQ:002 FIRST:PRD001 PREV:PRD001 NEXT:PRD003
```

An active volume (PRD002) containing no data sets was detected.

Procedure

Determine what caused the message by examining the record for the volume mentioned in the message (PRD002), as follows:

1 In the Inquire/Update entry panel (TI), type the VOLSER of the volume mentioned in the message.

2 Set DISPLAY TYPE to V

3 Press **ENTER**.

The Media Database list is displayed.

Figure 8   Media Database List

```
DATABASE LIST < V / V  > -------------------------------------------------(TI)
 COMMAND ===>                                              SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
   PRD002*     002 3490       08/08/00           0001          Active
 ====== >>>>>>>>>>>>>>  NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

The asterisk following the VOLSER indicates that volume PRD002 is part of a multi-volume chain.

4 Specify Option G (Group) to display the other volumes in the multi-volume chain:

Figure 9   Media Database List After 4

```
 DATABASE LIST < V / V  > ----------------------------------------------(TI)
  COMMAND ===>                                              SCROLL===> CRSR
  O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
  G PRD002*      002 3490       08/08/00            0001          Active
  ====== >>>>>>>>>>>>>>>  NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<<< ======
```

5 Specify Option S (Data set list) to the left of the volumes in the chain:

Figure 10   Media Database List After 5

```
 DATABASE LIST < V / V  > ----------------------------------------------(TI)
  COMMAND ===>                                              SCROLL===> CRSR
  O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
    PRD002*      002 3490       08/08/00            0001          Active
  S PRD001*      001 3490       08/08/00            0001          Active
  S PRD002*      002 3490       08/08/00            0001          Active
  S PRD003*      003 3490       08/08/00            0001          Active

  ====== >>>>>>>>>>>>>>>  NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<<< ======
```

The data sets on the volumes in the chain are displayed.

> **— NOTE —**
>
> Data set DSN.PRD01 is not listed in the Data Set list (S) for volumes PRD002 and PRD003 that are part of the multi-volume chain containing this data set. This indicates an error.

6 Specify Option A for data set record DSN.PRD01, and for volume records for PRD002 and PRD003.

Figure 11   Media Database List After 6

```
 DATABASE LIST < V / V  > ----------------------------------------------(TI)
  COMMAND ===>                                              SCROLL===> CRSR
  O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
    PRD002*      002 3490       08/08/00            0001          Active
    PRD001*      001 3490       08/08/00            0001          Active
  A   DSN.PRD01                                     0001          Active
  A PRD002*      002 3490       08/08/00            0001          Active
  A PRD003*      003 3490       08/08/00            0001          Active
  ====== >>>>>>>>>>>>>>>  NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<<< ======
```

Figure 12 shows the additional information for the DSN.PRD01 data set that is added to the screen. Note that the # of Volumes field is 000. This is the error that caused the messages that are being investigated.

Figure 12   List Showing Additional Information for Data Set DSN.PRD01

```
DATABASE LIST < V / V  > -------------------------------------------------(TI)
 COMMAND ===>                                                  SCROLL===> CRSR
 O VOLSER   VOLSEQ MEDIA      RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
    DSN.PRD01                                      0001      Active
    GENERAL INFORMATION:
    Sequence #:    0001                    # of Volumes:  000
    Rec Format:    F                       Rec Length:    00080
    Block Size:    00080                   Block Count:   00048
    Comp Size:     07953KB-001%            Tape Format:   256TRACK-IDRC
    Uncomp Size:   00001KB
    Use Count:     00001                   EXCP Count:    00352
    Modified:                              By User:       N74AUP2
    Job Account:
    RETENTION INFORMATION:
    Source:        RULES
    Retention:     CATALOG
    CREATION INFORMATION:
    Date:          08/08/00                Time:          03:42
    Job Name:      JOB1                    Step Name:     STEP1
    PGM Name:      PGM1                    DD Name:       DDNAME1
    UCB Addr:      0480                    CPU ID:
    Created By:                            JCL EXPDT:
    SMS MGMTCLS:
    --------------------------- END OF RECORD --------------------------------
```

Figure 13 shows additional information for volume record PRD002.

Figure 13   List Showing Additional Information for Volume Record PRD002

```
DATABASE LIST < V / V  > -------------------------------------------------(TI)
 COMMAND ===>                                                  SCROLL===> CRSR
 O VOLSER   VOLSEQ MEDIA      RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
    PRD002*    002            08/08/00             0001      Active
    GENERAL INFORMATION:
    Media Desc:    CARTRIDGE               Unit Name:     3490
    SL-Name:       PRD002                  Pool Name:     $$NOPOOL
    Location:      MAINLIB                 Owner:         N74
    Description:   PROD CARTS              Vendor Name:   IBM
    Label Type:    NL                      Tape Format:   256TRACK-IDRC
    Capacity Used: 00014MB 007%            Ret-Dataset:   0001
    Data Uncomp:   00052MB                 Physical vol:
    Use Count:     00001                   EXCP Count:    00352
    Last Access:                           By Job:
    Last Modified: 08/08/00                By User:       N74AUP2
    Move Date:                             Return Date:
    Check-In Date: 08/08/00                Clean Date:
    Scratch Date:                          Last Label:    0001
    Tape Library:                          Stk Group:
    MULTI-VOLUME:
    Volume Seq:    002                     First Volume:  PRD001
    Next Volume:   PRD003                  Prev Volume:   PRD001
```

Note that the MULTI-VOLUME data indicates that this volume is the second in the chain and that the next volume in the chain is PRD003. In addition, because the data set spans to the third volume, the file count for this volume is 0001, and the last label is 0001. This is correct.

Resolution

Use the DSNUPD function of the CTTMUP utility to update data set record DSN.PRD01 with the correct number of volumes (VOLSNUM=3) and use the GRPBIX function to correct the index pointers for the multi-volume chain.

Figure 14   Sample JCL for the DSNUPD and GRPBIX Functions

```
//I600INDB JOB  ,IOA600,MSGCLASS=X,CLASS=A
//*  THIS JOB UPDATES THE MDB ACCORDING TO USER'S INPUT
//CTTMUP  EXEC CTTMUP
//SYSIN    DD *
TYPERUN    MODE=NORMAL
DSNUPD     DSVOLSER=PRD001,DSLABEL=1,DSNAME=DSN.PRD01,VOLSNUM=3
GRPBIX     VOLSER=PRD001
/*
//
```

Problem 2 – Incorrect Number of Volumes Containing a Data Set

```
CTT990E RBA 000108: VOLSNUM (002) DIFFERS FROM # OF VOLUME RECORDS FOUND(001)
CTT999I D DSN.PRM04                              PRM004  001
```

Data set record DSN.PRM04 indicates that the data set spans two volumes, but only one volume was found containing this data set.

Procedure

1 In the Inquire/Update entry panel (TI), enter the DSNAME of the problem data set.

2 Set DISPLAY TYPE to D.

3 Press **Enter**.

The Media Database list is displayed.

Figure 15   Media Database List

```
DATABASE LIST < D / D  > -------------------------------------------------(TI)
COMMAND ===>                                            SCROLL===> CRSR
O ---DATASET NAME----------------------------    VOLSER  RETENTION  STATUS
  DSN.PRM04                                       PRM004  08/08/00   Active
====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
    Specify option S (Volume list) to the left of the dataset name.
DATABASE LIST < D / D  > -------------------------------------------------(TI)
    COMMAND ===>                                          SCROLL===> CRSR
O ---DATASET NAME----------------------------    VOLSER  RETENTION  STATUS
    S DSN.PRM04                                   PRM004  08/08/00   Active
====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

The list of volumes containing this data set is added to the display, as shown in
Figure 16. Only one volume is displayed for data set DSN.PRM04, indicating that this
is not a multi-volume data set. In addition, there is no asterisk to the right of the
volser field, which means that this volume is not part of a multi-volume chain.

Figure 16   List of Volumes Containing the Data Set

```
DATABASE LIST < D / D  > -------------------------------------------------(TI)
    COMMAND ===>                                          SCROLL===> CRSR
O ---DATASET NAME----------------------------    VOLSER  RETENTION  STATUS
    A DSN.PRM04                                   PRM004  08/08/00   Active
A   PRM004                          Files: 0001
 ====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

4 Specify Option A (Additional Information) for both the data set and the volume
containing it.

The additional information is added to the display. The following screen contains the
additional information for data set DSN.PRM04. Note that the # of Volumes field
contains a value of 002. This is an error.

Figure 17   List Showing Additional Information for Data Set DSN.PRM04

```
DATABASE LIST < V / V  > ---------------------------------------------(TI)
    COMMAND ===>                                          SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
    DSN.PRM04                                       0001      Active
    GENERAL INFORMATION:
    Sequence #:    0001                  # of Volumes:   002
    Rec Format:    FB                    Rec Length:     00080
    Block Size:    00080                 Block Count:    00048
    Compsize:      *                     Tape Format:    256TRACK-IDRC
    Uncomp Size:   *
    Use Count:     00001                 EXCP Count:     00121
    Modified:      08/08/00              By User:        N74AUP2
    Job Account:
    Stk Group:
    RETENTION INFORMATION:
    Source:        RULES
    Retention:     CATALOG
    CREATION INFORMATION:
    Date:          07/07/00              Time:           06:12
    Job Name:      JOB2                  Step Name:      STEP2
    PGM Name:      PGM2                  DD Name:        DDNAME2
    UCB Addr:      0481                  CPU ID:         ESA1
    Created By:    M72                   JCL EXPDT:
    SMS MGMTCLS:
```

Figure 18 shows additional information on volume PRM004.

Figure 18   List Showing Additional Information for Volume PRM004

```
DATABASE LIST < V / V  > ---------------------------------------------(TI)
 COMMAND ===>                                            SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
   PRM004            3490     08/08/01              0001      Active
     GENERAL INFORMATION:
     Media Desc:    CARTRIDGE             Unit Name:     3490
     SL-Name:       PRM004                Pool Name:     $$NOPOOL
     Location:      MAINLIB               Owner:         N74
     Description:   CARTRIDGE             Vendor Name:   IBM
     Label Type:    SL                    Tape Format:   256TRACK
     Capacity Used: 000014MB 007%         Ret-Dataset:   0001
     Data Uncomp:   000052MB              Physical vol:
     Use Count:     00000                 EXCP Count:    00243
     Last Access:                         By Job:
     Last Modified: 08/08/00              By User:
     Move Date:                           Return Date:
     Check-In Date: 08/08/00              Clean Date:
     Scratch Date:                        Last Label:    0001
     Tape Library:                        Stk Group:
```

No MULTI-VOLUME data exists for this volume. In addition, because the data set spans to the third volume, the file count for this volume is 0001, and the last label is 0001.

Resolution

1 Run the CTTRPT utility to determine if there is another volume record that refers to this volume in the PREVVOL or FIRSTVOL field. Figure 19 shows a sample JCL for activation of CTTRPT for this search:

Figure 19   Sample JCL for CTTRPT Activation

```
//REPORT1 JOB ,CTT,CLASS=A,MSGCLASS=X
//CTTRPT  EXEC CTTRPT,REGION=32M
//SYSIN   DD  *
 EXTRACT   PATH=VOLUME/FIRSTDS
 INCLUDE   FIRSTVOL=PRM004
 INCLUDE   PREVVOL=PRM004
 REPORT    NAME=GENERAL,PAGESIZE=63,LINESIZE=256,MARGINS=1-256
 FIELDS    VOLSER,DSNAME
 SORTBY    VOLSER
```

If no such volume is located, it indicates that the data set record is in error.

2 Use the DSNUPD function of the CTTMUP utility to update data set record DSN.PRM04 with the correct number of volumes (VOLSNUM=1). It is not necessary to rebuild the index pointers for this multi-volume chain after resolving this problem.

Problem 3 – Volume Chain Error

```
CTT983E RBA 000200: VOL: HIS001 CHAIN ERROR: INVALID PREV/NEXT POINTERS
CTT999I V HIS001 SEQ:001 FIRST:HIS001              NEXT:HIS002
CTT983E RBA 000201: VOL: HIS002 CHAIN ERROR: INVALID PREV/NEXT POINTERS
CTT999I V HIS002 SEQ:002 FIRST:HIS001
```

An error was detected in a multi-volume chain. The values for the PREVVOL and/or NEXTVOL fields are missing or invalid. Determine which of the pointers are wrong or missing. The volume records need to be updated with the correct PREVVOL and NEXTVOL information. The index pointers for this multi-volume chain only need to be rebuilt if the data set is not listed for each volume in the chain.

In this example, the Inquire/Update screen (TI), indicates that the volumes are part of a multi-volume chain for data set, DSN.HIS01, but the Additional Information screen (A) for volume HIS002 indicates that the Prev Volume pointer is missing.

Procedure

1 In the Inquire/Update entry panel (TI), enter the VOLSER of the volume in question.

2 Set DISPLAY TYPE to V.

3 Press **Enter**.

The Media Database list is displayed.

4 Specify Option G (Group) to the left of the problem volume (HIS001) to display the volumes in the multi-volume chain.

Note that volume HIS002 is not followed by an asterisk, indicating that it is not part of a multi-volume chain. This is an error.

5 Specify Option A (Additional Information) for volumes HIS001 and HIS002.

Figure 20   List of Volumes in the Multi-Volume Chain

```
DATABASE LIST < V / V  > ---------------------------------------------(TI)
 COMMAND ===>                                             SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
 A HIS001*     001            12/12/00             0001          Active
    HIS001*     001            12/12/00             0001          Active
     DSN.HIS01  002                                 0001          Active
 A  HIS002                    12/12/00             0001          Active
     DSN.HIS01                                      0001          Active
 ====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

6 Press **Enter**.

Additional information for volume record HIS001 is displayed.

Figure 21   List Showing Additional Information for Volume Record HIS001

```
DATABASE LIST < V / V  > --------------------------------------------------(TI)
 COMMAND ===>                                                   SCROLL===> CRSR
O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
  HIS001*    001             12/12/00             0001          Active
    GENERAL INFORMATION:
    Media Desc:    CARTRIDGE                  Unit Name:    3490
    SL-Name:       HIS001                     Pool Name:    $$NOPOOL
    Location:      MAINLIB                    Owner:        N74
    Description:   CARTRIDGE                  Vendor Name:  IBM
    Label Type:    SL                         Tape Format:  256TRACK
    Capacity Used: 00000MB 000%               Ret-Dataset:  0001
    Data Uncomp:   00000MB                    Physical vol:
    Use Count:     00000                      EXCP Count:   00000
    Last Access:                              By Job:
    Last Modified: 08/08/00                   By User:      N74AUP2
    Move Date:                                Return Date:
    Check-In Date: 08/08/00                   Clean Date:
    Scratch Date:                             Last Label:   0001
    Tape Library:                             Stk Group:
    MULTI-VOLUME:
    Volume Seq:    001                        First Volume: HIS001
    Next Volume:   HIS002                     Prev Volume:
```

Note that HIS002 is specified as the Next Volume in the MULTI-VOLUME data at the bottom of this screen.

Figure 22 shows additional information for volume HIS002.

Figure 22   List Showing Additional Information for Volume HIS002

```
DATABASE LIST < V / V  > --------------------------------------------------(TI)
 COMMAND ===>                                                   SCROLL===> CRSR
O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
  HIS002                     12/12/00             0001          Active
    GENERAL INFORMATION:
    Media Desc:    CARTRIDGE                  Unit Name:    3490
    SL-Name:       HIS002                     Pool Name:    $$NOPOOL
    Location:      MAINLIB                    Owner:        N74
    Description:   CARTRIDGE                  Vendor Name:  IBM
    Label Type:    SL                         Tape Format:  256TRACK
    Capacity Used: 00000MB 000                Ret-Dataset:  0001
    Data Uncomp:   00000MB                    Physical vol:
    Use Count:     00000                      EXCP Count:   00000
    Last Access:                              By Job:
    Last Modified: 08/08/00                   By User:      N74AUP2
    Move Date:                                Return Date:
    Check-In Date: 08/08/00                   Clean Date:
    Scratch Date:                             Last Label:   0001
    Tape Library:                             Stk Group:
    MULTI-VOLUME:
    Volume Seq:    002                        First Volume: HIS001
     Next Volume:                              Prev Volume:
```

Note that the Prev Volume field is blank. This is an error.

Resolution

Use the VOLUPD function of the CTTMUP utility to update the PREVVOL pointer in the volume record, HIS002.

Figure 23   Sample JCL for the VOLUPD Function

```
//I600INDB JOB  ,IOA600,MSGCLASS=X,CLASS=A
//*  THIS JOB UPDATES THE MDB ACCORDING TO USER'S INPUT
//CTTMUP  EXEC CTTMUP
//SYSIN    DD *
TYPERUN    MODE=NORMAL
VOLUPD     VOLSER=HIS002,PREVVOL=HIS001
/*
//
```

Problem 4 – Volume Chain Sequence Error

```
CTT983E RBA 000205: VOL: DBA003 CHAIN ERROR: VOLUME OUT OF SEQUENCE
CTT999I V DBA003 SEQ:005 FIRST:DBA001 PREV:DBA002 NEXT:DBA004
```

Volume record DBA003 that is part of a multi-volume chain has an invalid volume sequence number. Volume sequence numbers in a multi-volume chain must be consecutive. The volume record needs to be updated with the correct VOLSEQ data.

Procedure

1 In the Inquire/Update entry panel (TI), enter the VOLSER of the volume in question.

2 Set DISPLAY TYPE to V.

3 Press **Enter**.

The Media Database list is displayed.

4 Specify Option G (Group) to the left of the problem volume (DBA003), and specify Option A (Additional Information) for this volume.

The volumes in the multi-volume chain are displayed. Note that VOLSEQ number 005 is indicated for volume DBA0003.

Figure 24   List of Volumes in the Muti-Volume Chain

```
DATABASE LIST < V / V  > -----------------------------------------------(TI)
 COMMAND ===>                                              SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA      RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
   DBA003*     005             12/12/00             0001          Active
   DBA001*     001             12/12/00             0001          Active
   DBA002*     002             12/12/00             0001          Active
 A DBA003*     005             12/12/00             0001          Active
   DBA004*     004             12/12/00             0001          Active
 ====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< =====
```

The following screen shows the additional information fields for volume DBA003.

Figure 25   List of Additional Information for Volume DBA003

```
DATABASE LIST < V / V  > -----------------------------------------------(TI)
 COMMAND ===>                                              SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA      RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
   DBA003*     005             12/12/00             0001          Active
    GENERAL INFORMATION:
    Media Desc:    CARTRIDGE            Unit Name:    3490
    SL-Name:       DBA003               Pool Name:    $$NOPOOL
    Location:      MAINLIB              Owner:        N74
    Description:   CARTRIDGE            Vendor Name:  IBM
    Label Type:    SL                   Tape Format:  256TRACK
    Capacity Used: 00000MB 000%         Ret-Dataset:  0001
    Data uncomp:   00000MB              Physical vol:
    Use Count:     00000                EXCP Count:   00000
    Last Access:                        By Job:
    Last Modified: 08/08/00             By User:      N74AUP2
    Move Date:                          Return Date:
    Check-In Date: 08/08/00             Clean Date:
    Scratch Date:                       Last Label:   0001
    Tape Library:                       Stk Group:
    MULTI-VOLUME:
    Volume Seq:    005                  First Volume: DBA001
    Next Volume:   DBA004               Prev Volume:  DBA002
 --------------------------- END OF RECORD ---------------------------------
```

In the MULTI-VOLUME data at the bottom of the screen, DBA002 is indicated as the previous volume in the multi-volume chain, and DBA004 is indicated as the next volume. Because the previous screen showed that these volumes (DBA002 and DBA004) have volume sequence numbers of 002 and 004 respectively, it is apparent that the correct volume sequence number for volume DBA003 is 003.

Resolution

Use the VOLUPD function of the CTTMUP utility to set the correct sequence number (VOLSEQ=3).

Figure 26   Sample JCL for the VOLUPD Function

```
//I600INDB JOB  ,IOA600,MSGCLASS=X,CLASS=A
//*  THIS JOB UPDATES THE MDB ACCORDING TO USER'S INPUT
//CTTMUP  EXEC CTTMUP
//SYSIN   DD *
TYPERUN    MODE=NORMAL
VOLUPD     VOLSER=DBA003,VOLSEQ=3
/*
//
```

Problem 5 – Incorrect Number of Active Data Sets on a Volume

```
CTT987E RBA 000208: ACTIVEDS (006) DIFFERS FROM # OF DSN RECORDS FOUND
        (003)
CTT999I V MF0001 SEQ:000
```

A logical error was detected in a volume record. Volume record field ACTIVEDS specifies the number of active data sets on the volume. This field must contain the same number of data sets as the CTTIDB utility found on the volume.

Use the Inquire/Update screen (TI) to verify the correct number of data sets on the volume and update the ACTIVEDS field in the volume record. In this example, the Inquire/Update screen indicates that volume MF0001 contains three data sets but the FILES field indicated that the volume has six files.

Procedure

1 In the Inquire/Update entry panel, enter the VOLSER of the volume in question.

2 Set DISPLAY TYPE to V.

3 Press **Enter**.

   The Media Database list is displayed.

4 Specify Option S (Dataset List) to the left of the problem volume (DBA003).

   The data sets stored on the volume are displayed.

Figure 27   List of Data Sets Stored on the Volume

```
DATABASE LIST < V / V  > ---------------------------------------------(TI)
 COMMAND ===>                                              SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA    RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
   MF0001                      12/12/00           0006         Active
     D.MF1#1                                      0001         Active
     D.MF1#2                                      0002         Active
     D.MF1#3                                      0003         Active
 ====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

Although only three data sets are stored on this volume, the volume record indicates that there are six.

Resolution

1 Specify Option U (Update) for volume MF0001.

Figure 28   List Showing Volume Update Panel

```
DATABASE LIST < V / V  > ---------------------------------------------(TI)
 COMMAND ===>                                              SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA    RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
U MF0001                      12/12/00           0006         Active
     D.MF1#1                                      0001         Active
     D.MF1#2                                      0002         Active
     D.MF1#3                                      0003         Active
 ====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
The Volume Update panel is displayed.
VOLUME UPDATE PANEL                           (TI.UV)
 COMMAND ===>                                              SCROLL===> CRSR
 ----------------------------------------------------------------------------
 ¼ VOLSER     MF0001                          STATUS     Act-Out
   ¼ GENERAL INFORMATION:
   ¼ SL-NAME    MF0001                         OWNER      N74
   ¼ MEDIA TYPE  3490                          MEDIA DESC  CARTRIDGE
   ¼ DESCRIPTION  CARTRIDGE                     VENDOR NAME IBM
   ¼ STK GROUP
   ¼ RETENTION & LOCATION INFORMATION:
   ¼ RETENTION    DATE        121200           RET-DATASET 001
   ¼ LOCATION    MAINLIB                        MOVE DATE   090900
   ¼ CHECKIN DATE 080800                        RETURN DATE
   ¼ TAPE LIBRARY
   ¼ USAGE INFORMATION:
   ¼ ACTIVE DS#   0006                          LAST LABEL  0006
   ¼ CAPACITY USD 00000 (MB) 000%               EXCP COUNT  00000
   ¼ DATA UNCOMP  00000 (MB)
 ¼ LAST ACCESS  080800                         BY JOB      JOB5
   ¼ CLEAN COUNT  00000                         CLEAN DATE
   ¼ USER INFORMATION:
   ¼ USER FIELD
```

2 Correct the value in fields ACTIVE DS# and LAST LABEL and return to the data set list.

3 Press **(PF03/PF15)** to save the update and to exit the Volume Update panel.

A confirmation window is displayed. Note that 006 is still specified for the FILES field.

Figure 29   Volume Update Confirmation Window

```
DATABASE LIST < V / V  > -----------------------------------------------(TI)
 COMMAND ===>                                              SCROLL===> CRSR
 O VOLSER    VOLS       +-----------------------+  FILES LOCATION ---STATUS----
 U MF0001         <----- |   CONFIRM Y   (Y/N)   |  0006        Active
    D.MF1#1             +-----------------------+    0001        Active
    D.MF1#2                                          0002        Active
    D.MF1#3                                          0003        Active
 ====== >>>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

4 Enter **Y** to confirm the change.

After confirmation, the FILES specification is updated.

Figure 30   Files Specification Update Window

```
DATABASE LIST < V / V  > -----------------------------------------------(TI)
 COMMAND ===>                                              SCROLL===> CRSR
 O VOLSER    VOLSEQ MEDIA     RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
   MF0001           3490      12/12/00             0003        Act-Out
    D.MF1#1                                          0001        Active
    D.MF1#2                                          0002        Active
    D.MF1#3                                          0003        Active
 ====== >>>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

Problem 6 – Missing Index Key

```
CTT984E RBA 000303: KEY NOT FOUND. RECTYPE: D, MISSING KEY: L
CTT999I D DSN.L0006                                   L00006 001
```

A data set record with no L-type index record (key) was detected. Use the Inquire/Update screen (TI) to verify the data set and volume.

The data set record for data set DSN.L0006 indicates that it is stored on volume L00006, but the data set list for this volume does not list the data set (although it does indicate the number of files is equal to 0001).

Procedure

1 In the Inquire/Update entry panel, enter the DSNAME of the problem data set (DSN.L0006).

2 Set DISPLAY TYPE to D.

3 Press **Enter**.

The Media Database list is displayed.

Figure 31   Media Database List

```
DATABASE LIST < D / D  > -------------------------------------------------(TI)
  COMMAND ===>                                               SCROLL===> CRSR
  O ---DATASET NAME---------------------------    VOLSER  RETENTION  STATUS
    DSN.L0006                                     L00006  CATALOG    Active
     L00006                               Files: 0001
  ====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

4 Specify Option S (Volume list) to the left of the problem data set.

The problem volume is displayed.

5 Return to the Inquire/Update screen (TI) and specify the volser and display type V.

The volume information for volser L00006 is displayed.

Figure 32   List of Volume Information for Volser L00006

```
DATABASE LIST < V / V  > -------------------------------------------------(TI)
  COMMAND ===>                                               SCROLL===> CRSR
  O VOLSER     VOLSEQ MEDIA      RETENTION  L-ACCESS  FILES LOCATION ---STATUS----
    L00006            3490       12/12/00             0001           Active
  ====== >>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

6 Specify Option S (Dataset list) to the left of the problem volume.

Note that no data sets are listed for this volume. This is due to the index problem under examination.

Resolution

Use the CTTMUP utility to rebuild the index pointers for VOLSER=L00006 and the relevant data set records.

Figure 33   Sample JCL for the CTTMUP Utility

```
//I600INDB JOB  ,IOA600,MSGCLASS=X,CLASS=A
//*  THIS JOB UPDATES THE MDB ACCORDING TO USER'S INPUT
//CTTMUP  EXEC CTTMUP
//SYSIN    DD *
TYPERUN    MODE=NORMAL
VOLBIX     VOLSER=L00001
/*
//
```

Data Set Stacking

This chapter includes the following topics:

Overview

Stacking is the process by which CONTROL-M/Tape places data sets with similar attributes (for example, retention) together on a volume. Data set stacking is a concept unique to CONTROL-M/Tape. Therefore, it is recommended that you not implement this feature until CONTROL-M/Tape is already running in Global Production mode (meaning, the old tape management system is no longer active at your site).

Two types of data set stacking can be performed by CONTROL-M/Tape.

Table 11   Data Set Stacking Types

Type	Description
Batch stacking	Handles already existing data sets through the CTTSBD CONTROL-M/Tape utility that is run in batch mode.
Dynamic Data set stacking	Handles newly created data sets during real-time operations.

Through Data Set Stacking, CONTROL-M/Tape can optimize usage of the storage space in your tape libraries.

Batch Stacking

The CTTSBD CONTROL-M/Tape utility enables you to stack data sets already on tapes at your site. This utility can be used to free scratch tapes, override stacking limitations imposed by your real-time stacking definitions, and organize data sets that existed before your site's tapes were managed by CONTROL-M/Tape.

To immediately benefit from CONTROL-M/Tape stacking capabilities, you can use the CTTSBD utility to stack existing data sets at your site before implementing Dynamic data set stacking (described below).

For more information about batch stacking, see the CTTSBD utility in the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide*.

Dynamic Data Set Stacking

When a scratch volume is requested for a new data set, CONTROL-M/Tape can automatically direct the data set to an active volume that contains one or more files with attributes similar to the new data set.

CONTROL-M/Tape analyzes characteristics (for example, retention criteria and vault patterns) of each new data set, and searches for a volume with data sets with matching criteria and enough free space. The new data set is then added to the volume. This process is called dynamic data set stacking.

This feature is controlled by the DYNSTK CONTROL-M/Tape installation parameter and the DO STACK statement that must appear in a CONTROL-M/Tape rule for the data set.

For a general description of the data set stacking logic, see the description of stacking in the organization and administration chapter of the *CONTROL-M/Tape User Guide*. The following discussion assumes an understanding of the stacking algorithms and operation of CONTROL-M/Tape.

General Considerations for Dynamic Data Set Stacking

Before activating the Dynamic Data Set Stacking facility, verify that the parameters relevant to the Dynamic Data Set Stacking facility are set during installation.

In general, CONTROL-M/Tape Dynamic Data Set Stacking facility selects a volume for stacking only if the following conditions are met:

■ The DYNSTK parameter is set to Y in the CTTPARM member and a DO STACK=Y statement is specified in a matching rule.

■ The job names and data set names of the creating and created jobs have a matching entry in the Stacking Database. If you want to change this criteria (for example, consider all data sets with a specific prefix as the same data set for stacking purposes), you can use the CTTX002 Dynamic Data Set Stacking facility user exit to override the default operation of CONTROL-M/Tape.

■ The average size megabytes of the specified data set is read from the appropriate entry in the Stacking Database. If this information cannot be found, stacking cannot continue. To avoid this problem, specify a default size for data sets through the STKDEFSZ parameter in the CTTPARM member.

   The value of the STKDEFSZ installation parameter can optionally be overridden for a data set or group of data sets through a DO STKDEFSZ statement in a CONTROL-M/Tape rule.

■ An appropriate volume is found in the Media Database. This volume must be eligible for stacking, have sufficient free space, and belong to the same pool as the data set to be stacked. Depending on the specification for the STKMODE CONTROL-M/Tape parameter, the volume used for stacking may also need to have the same vaulting pattern as the data set to be stacked.

The search for a suitable volume can be controlled by Exit 10 (Find Stackable Volume) that controls the stacking algorithm. For more information about Exit 10, refer to the CTTX010 member in the IOA SAMPEXIT library.

The search can be limited to a specific number of volumes through the STKSRCHL parameter in the CTTPARM member or through a DO STKSRCHL statement in a CONTROL-M/Tape rule.

■ The data set to be stacked is allocated in a DD statement in the JCL of a job. CONTROL-M/Tape stacks data sets that are allocated dynamically (using SVC 99) only if the STKALCD parameter was set to Y in the CTTPARM member.

NOTE

For a more complete list of conditions, considerations and parameters, see the description of stacking in the organization and administration chapter of the *CONTROL-M/Tape User Guide*.

■ Non-scratch (Active) volumes converted to CONTROL-M/Tape from another Tape Management System are considered not eligible for stacking. Stacking is only performed for volumes that were moved from scratch status to non-scratch status (meaning, the first data set was created on the scratch volume) while CONTROL-M/Tape was operational.

NOTE

Active volumes converted from the other tape management system can be stacked through the CTTSBD batch stacking utility (described above). For more information see the description of the CTTSBD utility in the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide*.

The remainder of this chapter describes how to implement the Dynamic Data Set Stacking facility at your site.

Before Implementation

As with any automated process to be implemented system-wide, the key to efficient and trouble free stacking is proper preparation. Procedures must be established and standards should be set.

Below is a description of the basic preparatory steps that should be performed before dynamic data set stacking is implemented at your site.

Review Working Procedures

Determine the standards for data organization at your site. Note that properly enforced standards contribute to more efficient data set stacking.

Typical questions that should be answered are:

- What kind of retention is used?

- What standards are used to determine vault patterns?

- What naming conventions are used? For example, which prefixes are assigned to data sets created by the various applications in use at your site.

- Are pools used at your site? If so, which pools are assigned to the various applications and/or departments in use at your site?

> **— NOTE —**
> Certain information in your Media Database may not be entirely accurate. For example, you may have sent tapes to another site without informing CONTROL-M/Tape that these tapes are no longer present in the MAINLIB library.

Correct all known inconsistencies to ensure efficient data set stacking.

Identify Data Sets That Should Not be Stacked

Some data sets need to be insulated from other data sets in your system. These data sets must be identified and excluded from implementation of the Dynamic Data Set Stacking facility. Types of data sets that should not be stacked include:

- Data sets created by software products that expect their data sets to be stored on separate volumes (for example, SAR/Express files).

- Data sets that need to be sent to other data centers or systems that are not recognized by local vaulting procedures (as described above).

- Data accessed by other systems (MVS or non-MVS) that may be updated without CONTROL-M/Tape being notified. For example, an updated data set may not be recorded in the MVS Catalog by the application or system that is creating the data set.

Select Test Environment for Stacking Implementation

It is recommended that you first implement the Dynamic Data Set Stacking facility for a limited number of data sets in a specific environment.

Testing a single job with a single data set is usually the first step in activating the Dynamic Data Set Stacking facility.

After this test, you can choose to implement stacking for additional data sets according to application, data set name, and so on.

Technical Preparation

Review Installation Parameters

Review the CONTROL-M/Tape installation parameters relevant to the Dynamic Data Set Stacking facility and verify that appropriate values are specified. If you change any of these parameters except for DYNSTK and STKUNIT, reload it into the real-time environment using the following command:

```
S CTTINIT,PARM='RELOAD,TBLT=PARM'
```

If you change the value of the DYNSTK parameter or the STKUNIT parameter, the new values take effect only after CONTROL-M/Tape is stopped and then restarted.

Table 12   Installation Parameters (part 1 of 4)

Parameter	Description
DYNSTK	Determines whether the CONTROL-M/Tape Dynamic Data Set Stacking Facility is activated. Specify Y (Yes) for this parameter.

Table 12   Installation Parameters (part 2 of 4)

Parameter	Description
STKMODE	Determines the search algorithm used by the Dynamic Data Set Stacking facility. The search is performed for each data set that is eligible for stacking to find the best matching volume. The selected search method influences both volume utilization and the resources required to search the Media Database for a matching volume.
	Note: This parameter can be overridden for a specific data set or data sets through a DO STKMODE statement in a CONTROL-M/Tape rule.
	Valid values are: ■ S—Simple search. Searches for volumes from the same pool only. Default. — Data sets that are to be vaulted are not stacked. — Data sets to be stacked are not placed on volumes that are vaulted or will be vaulted. ■ V—Searches the same pool for volumes that have a vaulting pattern similar to the stacked data set. If the data set is to be vaulted, only volumes that have a matching vault pattern are considered. If the data set is not to be vaulted, only volumes that are not to be vaulted are considered. ■ R—Searches the same pool for volumes that have a similar or later expiration date.
	Note: A permanent retention data set is stacked on a volume only if its last data set has permanent retention.
	■ A—Searches for volumes that satisfy the requirements of both V and R, above.
STKTEST	Determines whether stacking takes place while CONTROL-M/Tape is operating in Global Test mode. If you are testing the Dynamic Data Set Stacking facility while in Global Test mode, set this parameter to Y; otherwise, specify N.
	Note: Setting STKTEST to Y affects your production environment's decisions regarding where (meaning, to which volume) a data set should be written while CONTROL-M/Tape is operating in Global Test mode.
STKSRCHL	Maximum number of volumes to be searched for a stackable volume. This parameter must contain a numeric value from 0 through 9999. Default: 0 (no limit) If the Dynamic Data Set Stacking facility searched the specified maximum number of volumes and did not find a suitable volume, the data set is written to a scratch volume.
	Note: This parameter can be overridden for a specific data set or data sets through a DO STKSRCHL statement in a CONTROL-M/Tape rule.

Table 12   Installation Parameters (part 3 of 4)

Parameter	Description
STKDEFSZ	When a data set about to be stacked cannot be located in the Stacking Database, CONTROL-M/Tape references this parameter for a default size (in megabytes) for the data set.
	This parameter must contain a numeric value from 0 through 99999. Default: 10.
	Note: When STKDEFSZ is set to 0, no default is used. If the data set entry is not found in the Stacking Database, stacking is not performed for that data set.
	You can override the STKDEFSZ installation parameter for a specific data set or data sets through a DO STKDEFSZ statement in a CONTROL-M/Tape rule.
STKUNIT	Defines all unit names (as they appear in JCL) that are eligible for dynamic data set stacking. The format is: `STKUNIT=(unit1,unit2,.....)`
	Note: The STKUNIT installation parameter is ignored during handling of data sets managed by DFSMS. These data sets are considered stackable regardless of the unit name that is associated with them.
STKKEEP	Determines whether stacking takes place when DISP is set to (NEW,KEEP) for the data set. When STKKEEP is set to N, only data sets with DISP set to (NEW,CATLG) are stacked.
CTTMEDDF	Defines a CONTROL-M/Tape logical media definition. This parameter is used to define a series of media attributes for each media type in use at the site. Relevant subparameters for the Dynamic Data Set Stacking facility are:
STKPCNT	Percentage of this media that can be filled up by dynamic stacking. This subparameter must contain a numeric value from 0 through 99.
CAPACITY	Media size (in megabytes). A value from 0 through 99999 can be specified. For more information, see Step 2.11 of the CONTROL-M/Tape installation in the *INCONTROL for z/OS Installation Guide.*

Table 12   Installation Parameters (part 4 of 4)

Parameter	Description

STKVNSPC	Determines whether CONTROL-M/Tape selects volumes with non-specific retention for dynamic stacking.
	
	Valid values are:
	
	■ N – CONTROL-M/Tape does not select volumes with non-specific retention. Default.
	■ R – CONTROL-M/Tape selects volumes with non-specific retention.
	■ V – CONTROL-M/Tape selects volumes with vault retention set to UNTIL EXPIRED.
	■ A – CONTROL-M/Tape selects volumes with either or both of the following:
	  ■ non-specific retention
	  ■ vault retention set to UNTIL EXPIRED
	
	If you stack data sets on volumes with non-specific retention, CONTROL-M/Tape stacks the data sets on the volumes according to the retention of the last data set on the volume, as follows:
	
	■ If the last data set is set to specific retention, the incoming data set is stacked on the volume if its retention period is shorter than that of the last data set on the volume.
	
	■ if the last data set on the volume has non-specific retention periods that have a statistical record, the incoming data set is stacked on the volume if its retention period is shorter than that of the last data set on the volume.
	
	If the last data set on the volume has non-specific retention periods that do not have a statistical record, the volume is not used for stacking.

STKALCD	Whether the CONTROL-M/Tape Dynamic Stacking facility is activated under Dynamic allocations (SVC 99). Valid values are: ■ N – Do not perform Dynamic Stacking for data sets which are allocated by dynamic allocation (SVC 99). Only data sets allocated by DD cards in the JCL will be considered for Dynamic Stacking. Default. ■ Y – Perform Dynamic Stacking for data sets which are allocated by dynamic allocation (SVC 99).

CTTSTK

Verify that the CTTSTK utility is not commented out in the New Day procedure (CTTDAY).

If the CTTSTK utility was commented out, BMC Software recommends that you run this utility on the Media Database (it is normally run on the Trace file) to collect the statistics needed for stacking implementation.

— **NOTE** ————————————————————————————————————

If the Dynamic Data Set Stacking facility is activated without running utility CTTSTK, stacking decisions are based on the default data set length specified in the STKDEFSZ parameter (described above).

For more information about the CTTSTK utility, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide.*

Research Your System

- Analyze the Media Database using utility CTTRPT. A wide variety of reports can be generated through this utility. Some examples of how this utility can be used to extract information for stacking implementation are listed below.

  — List under-utilized volumes (through the CTTRUTIL sample report). The volumes in this report are sorted by used capacity to help identify the best candidate volumes for stacking implementation.

  — Sort the inventory by data set name. Usually this results in sorting the data sets according to application (due to naming conventions).

  Sample CTTRPT reports are located in the IOA SAMPLE library. For more information about the CTTRPT utility, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide.*

- Identify candidate data sets for stacking implementation. Selection of data sets should depend on:

  — the type of application that generated the data sets

  — which data sets belong to an application that frequently encounters a shortage of scratched volumes

  — the size of relevant data sets

  — which data sets are assigned to each pool (if pools are in use at the site)

- If you are working with STKMODE set to R or A, data sets for which retention is not a specific date or number of days (for example, retention type CATALOG, CYCLES, or LAST ACCESS) are stacked according to their average life span. The Dynamic Data Set Stacking facility calculates the expected expiration date of each such data set (from information in the Stacking Database) and stacks them according to the requested search algorithm.

  If you prefer that data sets with non-specific retention be handled in a different way, generate a list of these data sets through the CTTRPT report utility, and define CONTROL-M/Tape rules that include the DO STKMODE=S statement for these data sets.

- Identify potential conflicts (meaning, data sets that should not be stacked together). The CTTSCA CONTROL-M/Tape utility can be used to automatically detect certain types of conflicts and to generate rules that prevent those conflicts from occurring. For more information, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide*.

- Identify groups of data sets that should reside together. These data sets should be identified as stacking groups through DO STKGROUP statements in CONTROL-M/Tape rules.

Implementation

If CONTROL-M/Tape was brought up without activating the Dynamic Data Set Stacking facility, you have to stop CONTROL-M/Tape and restart it in order activate this facility.

— *NOTE*
If CONTROL-M/Tape was brought up with stacking activated, stacking can be stopped and started through commands STOPSTK and STARTSTK.

Determine which data sets, jobs, and tape pools should be stacked.

- Verify that the appropriate rules have been defined, coded, and activated (ordered) for these data sets, jobs, or tape pools.

- The DO STACK=Y statement must be included in rules that refer to the data sets that are to be stacked. Rules modified to support stacking must be reloaded into the CONTROL-M/Tape Real-time environment using the following command:

```
S CTTINIT,PARM='RELOAD,TBLT=RULE'
```

- Use the CTTCRSS ISPF online utility to ensure that the stacking rules you are invoked for the appropriate jobs and data sets. (TSO%CTTCRSS, or from the IOA Online Utility menu, specify Option 6, followed by Option T1.)

- Make sure that all stacking rules are in production mode (that is, MODE is set to PROD in the rule definition).

- Use DO STKRULE statements in the rules to prevent possible data set conflicts (see the CTTSCA utility in the CONTROL-M/Tape Utilities chapter of the *INCONTROL for z/OS Utilities Guide*).

- Use DO STKGROUP statements in the rules to define logical groups of data sets. Each data set is stacked only with other data sets that have been assigned the same group name.

For more information about specific DO statements in CONTROL-M/Tape rules, see the rule parameters chapter of the *CONTROL-M/Tape User Guide.*

For more information about conditions necessary for stacking implementation, see the description of stacking in the organization and administration chapter of the *CONTROL-M/Tape User Guide.*

Stacking Rules

Dynamic data set stacking can be controlled by a variety of different DO statements in CONTROL-M/Tape rules. These DO statements enable specification of stacking criteria that affect only the data set or data sets processed by a specific rule. The DO statements that can be specified are shown in Table 13.

Table 13   Dynamic Stacking DO Statements

Statement	Description
DO STACK	Indicates that the data set should be stacked.
DO STKDEFSZ	Default length for the data set if it is to be stacked.
DO STKGROUP	Stacking group for the data set.
DO STKMODE	Method to be used for stacking the data set.
DO STKMXLBL	The highest label number that can be assigned to the data set when it is stacked (meaning, the data set cannot be stacked on a volume or volume chain that already has the specified number of labels).
DO STKMVOL	The highest volume sequence number of a volume on which the data set is to be placed (meaning, the data set cannot be stacked on a volume chain that already has the specified number of volumes).
DO STKRULE	Stacking limitation for the data set.
DO STKSRCHL	Maximum number of volumes that can be considered for stacking the data set.

For more information about these DO statements, see the rule parameters chapter of the *CONTROL-M/Tape User Guide.*

> ── **NOTE** ────────────────────────────────────
> Additional stacking and filtering rules can be implemented using CONTROL-M/Tape Exit 10. A sample version of Exit 10 is supplied in the CTTX010B member of the IOA SAMPEXIT library. For more information about CONTROL-M/Tape Exit 10, see the CTTX010 member in the IOA SAMPEXIT library.

Troubleshooting

If the Dynamic Data Set Stacking facility is not working as expected, use the following steps to find and fix the problem:

Identify Problem Data Set and run Rule Simulation

Identify the data set, job, and so on for which stacking is not working as expected.

Use ISPF online utility CTTCRSS (rule simulation) to determine which rules are triggered for the data set or job. Verify that each of the appropriate rules is in production mode (that is, MODE is set to PROD), and that the DO STACK=Y statement is included.

Check JCL

Verify that the data set names, job names, and so on specified in the JCL are consistent with the names specified in the relevant CONTROL-M/Tape rules. Ensure that DISP is set to (NEW,CATLG) for the data set. Alternatively, ensure DISP is set to (NEW,KEEP), and STKKEEP is set to r, in the CTTPARM member.

Check MVS Jobname Monitoring

The CONTROL-M/Tape subsystem receives control when message IEF403I ("jobname STARTED") is issued. Verify that MVS monitoring of job names is turned on (that is, that this message is not suppressed).

If necessary, command MONITOR JOBNAMES can be used to turn on MVS jobname monitoring. This command should also be included in the CONSOL*xx* member in the SYS1.PARMLIB library (or any equivalent) to ensure that the command is automatically issued at each IPL.

Check Stacking Statistics Collection

Verify that the job name in the JCL is the same as the job name for which statistics were collected by the CTTSTK utility. (This may not be the case if data sets with the same name were created by two different jobs.)

Make sure that the CTTSTK utility is included as a step in the New Day procedure (CTTDAY). This utility reviews the CONTROL-M/Tape Trace file and collects the statistics needed for operation of the Dynamic Data Set Stacking facility.

This information can also be obtained by running the CTTSTK utility, using the CONTROL-M/Tape Trace file as input.

The CTTSTKR utility can also be used to list the contents of the Stacking Database. For more information on the CTTSTKR utility, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide.*

Check Exit 2

CONTROL-M/Tape Exit 2 (CTTX002) can be used to modify the name of a job that creates a data set, the data set name and so on, so that certain data sets are considered as successive generations of the same data set in the Stacking Database. Sample Exit CTTX002R demonstrates how this exit can manipulate dsnames and jobnames to allow specification of stacking attributes according to dsnames and jobnames with shorter prefixes. For example, this exit can be used to group data sets with the same jobname and different suffixes (for example, to ignore timestamps in data set names).

Incorrect coding of Exit 2 may cause dynamic data set stacking problems.

For more information about this exit, see the CTTX002R and CTTX002 members in the IOA SAMPEXIT library.

Check Unit Name

Verify that the unit specified in the JCL has been specified through the STKUNIT CONTROL-M/Tape installation parameter in the CTTPARM member.

> **— NOTE ——————————————————————————————**
> If Y is specified for CONTROL-M/Tape installation SMSINTR, the STKUNIT parameter is ignored for data sets managed by DFSMS. For more information about CONTROL-M/Tape handling of DFSMS-managed data sets, see Chapter 10, "CONTROL-M/Tape DFSMS Interface."

Check for a //NOSTACK DD Statement

Make sure that a //NOSTACK DD statement is not included in the JCL.

Determine why the Data set was not Stacked

If, after making the above checks, a data set was still not stacked as expected, review the reasons why the expected action was rejected.

CONTROL-M/Tape checks each prospective stacking action in three stages:

1. JCL (DD statements)

2. data set considerations

3. volume considerations

4. dynamic allocation (SVC 99) considerations

Each of these stages can result in rejection of the action. Each rejection is assigned a reason code. (The rejection reasons for each stage are described later in this chapter.

Normally only rejection reasons due to data set considerations are visible to the user. Each time a data set is rejected for stacking, the CTT356W message is issued. This message is followed by a message that describes why the data set was not stacked. (Data set rejection reasons are issued by the CTTSTH CONTROL-M/Tape module.)

If a data set was not stacked but no CTT356W messages were issued, stacking may have been rejected for all volumes in the specified pool. To display rejection reasons for volumes, specify a CTTSTKRL DD statement (for example, CTTSTKRL DD DUMMY) in any step of the job that creates the data set to be stacked. This DD statement causes a rejection reason to be issued for each volume that is rejected during the search for a volume on which to stack the data set.

If no data set or volume rejection reason is found to explain a failed stacking attempt, stacking may have been rejected due to a job statement or dynamic allocation consideration. Review the job statement rejection reasons below or the dynamic allocation rejections to understand the cause of the problem.

> _— **NOTE** _____
>
> Job statement rejection reasons and dynamic allocation rejection reasons are only visible to the user if the trace level is set to 324 by CONTROL-M/Tape's started task CTTINIT. BMC Software recommends using CTTINIT with the following syntax to obtain the reason for the rejection:
>
> ```
> S CTTINIT,PARM='TL=324,TJ=job-name'
> ```
>
> To stop trace level messages, use:
>
> ```
> S CTTINIT,PARM='TL=0'
> ```

Job Statement Considerations

Certain specifications in the DD statements of a job may make it impossible to stack data sets accessed or created by the job. The table shown below lists each rejection reason code and a description of the problem it indicates.

Table 14   Job Statement Rejection Reason Code (part 1 of 2)

Reason Code	Description
1	The VOL=REF=DSNAME statement was included in the JCL. CONTROL-M/Tape ignores references to data set names that appear earlier in the JCL.
2	A reference to a step name or procedure step name was specified in the JCL (for example, VOL=REF=*). CONTROL-M/Tape ignores references to data set names that appeared earlier in the JCL.
3	The current DD statement is a NOSTACK DD statement. CONTROL-M/Tape interprets this DD statement as an instruction not to stack data sets created by this job.
4	A NOSTACK DD statement that is not the current DD statement was specified in the relevant step in the JCL.
6	A specific volser was specified as a destination for the current data set. CONTROL-M/Tape honors the user's request for the specific tape and does not stack this data set.

Table 14   Job Statement Rejection Reason Code (part 2 of 2)

Reason Code	Description
7	The VOL parameter in the current DD statement indicates that the data set can be written to more than one volume. Example VOL=(,,,2) where 2 is the maximum number of volumes Multi-volume data sets are not stacked.
	Note: You can bypass this reject reason by setting the STKVCBP parameter in the CTDPARM member to Y. For more information, see the *INCONTROL for z/OS Installation Guide*.
9	The DISP=NEW statement was not included in the JCL. There is no need for CONTROL-M/Tape to stack the data set because no new data set was created.
A	The DISP=(NEW,CATLG) statement was not included in the JCL, and Y was not specified for the STKKEEP CONTROL-M/Tape installation parameter.
B	A non-standard label (for example, BLP or NL) was specified for the current data set. CONTROL-M/Tape stacks only data sets for which a standard label is specified.
C	The specified file sequence number is greater than 1. Either a file sequence number of 1, or no file sequence number, should be specified for data sets to be stacked.
D	EXPDT = 98000 is specified for the current data set (that is, the volume is an external volume). CONTROL-M/Tape does not stack these data sets.

Data Set Rejection Reasons

As mentioned above, data set rejection reasons are listed in the job log following CTT356W messages.

Table 15   Data Set Rejection Reason Code (part 1 of 2)

Reason Code	Description
10	CONTROL-M/Tape is running in Global Test mode.
11	Exit 2 disallowed stacking for the data set.
12	No rule was found for the data set.
13	A rule was found for the data set but the DO STACK=YES statement was not included in the rule.
14	The data set is managed by an external data manager (EDM).
15	CONTROL-M/Tape rules for the data set were run in Test mode.
16	The rule associated with the data set being created specifies a vault pattern for the data set, but neither V nor A was specified for the STKMODE parameter.

Table 15   Data Set Rejection Reason Code (part 2 of 2)

Reason Code	Description
17	No statistics were found for the data set and no default statistics were specified in the STKDEFSZ parameter.
18	The data set is not stackable (for example, because //NOSTACK was specified in the JCL).
19	The DO POOL statement in the relevant rule specifies a pool that was not defined to CONTROL-M/Tape.
20	Internal error. Contact your local INCONTROL representative for more information.
21	An eligible volume with sufficient space for the data set could not be found in the specified pool.
22	No media was specified in the CTTMEDDF CONTROL-M/Tape installation.
23	Stacking for the data set was stopped due to a request from CONTROL-M/Tape Exit 10.
24	Either the unit specified in the JCL was not specified in the STKUNIT CONTROL-M/Tape installation parameter, or the data set is managed by DFSMS but was not assigned storage group of type TAPE.

Volume Rejection Reasons

The following rejection reasons indicate that a specific volume was rejected during the search for a volume on which to stack the current data set. These rejection reasons do not necessarily mean that the data set was not stacked. Many volumes may be considered and rejected during the search for a volume on which to stack a data set.

Table 16   Volume Rejection Reason Code (part 1 of 3)

Reason Code	Description
30	The volume is not active. Data sets can only be stacked on active volumes.
31	The volume is one of the following: ■ an external volume ■ controlled by an EDM ■ temporarily recalled from the vault ■ not in the Active library (MAINLIB)
32	The volume is not stackable (for example, it contains a data set created with the DISP=MOD expression), or the volume is in use.
33	A data set with retention type PERMANENT is on the volume, and the current data set has a different retention type.
34	A data set with retention type DATE is on the volume, and the current data set has a different retention type.

Table 16   Volume Rejection Reason Code (part 2 of 3)

Reason Code	Description
35	The expiration date of the current data set is later than the expiration date of the last data set on the volume.
36	The retention type of the current data set is PERMANENT or DATE, and the data sets on the volume have other retention types.
37	The volume has a status of Pend-Vault and neither V nor A was specified for the STKMODE installation parameter.
38	The volume has a status of Pend-Vault and the relevant rule does not specify a vault pattern (meaning, no DO VAULT statements were specified).
39	The volume's media type was not specified in the CTTMEDDF installation parameter.
40	There is not enough space on the volume for the data set to be stacked.
41	The volume is about to be returned from a vault.
42	The vault pattern of the current data set has a different number of vaults than the vault pattern of the candidate volume.
43	The vault pattern of the current data set indicates different vaults than those specified in the vault pattern of the candidate volume.
44	The vault pattern of the current data set indicates different vault retention types than those specified in the vault pattern of the candidate volume.
45	The vault pattern of the current data set indicates different vault retention dates than those specified in the vault pattern of the candidate volume.
46	More than one possible retention type was specified for the current data set and/or the data sets on the volume. The AND/OR relationships between these retention types in the vaulting pattern of the data set are different from those specified in the vaulting pattern of data sets already on the volume.
47	The volume is being accessed by another user.
48	CONTROL-M/Tape utility CTTGVL was used to hold a scratch volume for the data set. This rejection reason is returned when the volume held by utility CTTGVL was not scratch.
49	CONTROL-M/Tape searched the maximum allowed number of volumes for a volume on which to stack the data set, and did not find a suitable volume.
50	The volume was rejected by CONTROL-M/Tape Exit 10.
51	The stacking group of the data set does not match the stacking group of the volume.
52	The volume was rejected due to a DO STKRULE statement (in a CONTROL-M/Tape rule) that does not allow the current data set to be stacked with the data sets on this volume or does not allow stacking with data sets created by the job that created one or more of the data sets of this volume.

Table 16   Volume Rejection Reason Code (part 3 of 3)

Reason Code	Description
53	The volume already contains the maximum allowed label number value (the STKMXLBL parameter).
54	The volume is not an SL (Standard Label) volume.
55	The volume that was selected by Exit 10 is from the wrong pool.
56	Current data set has a vault pattern, but the volume does not have a status of POTENTIAL VAULT.
57	Volume is already referenced by the current job.
58	Sequence number of current volume exceeds the limit set by the STKMXVOL parameter.
59	Volume and data set have conflicting vaulting methods, (meaning, one is to be vaulted by box while the other is to be vaulted by slot).

Dynamic Allocation Considerations

Certain specifications in the dynamic allocation (SVC 99) parameters may make it impossible to stack data sets. The table shown below lists each rejection reason code and a description of the problem it indicates.

Table 17   Dynamic Allocation Consideration Code

Reason Code	Description
90	CONTROL-M/Tape real-time environment is currently not operate in Stacking mode.
91	A VOLSER was specified.
92	VOL=REF=DSNAME was specified.
93	A data set label other than 1 was specified.
94	EXPDT=98000 was specified.
95	A non-standard label (SL) was specified.
96	DISP=NEW was not specified.
97	Data set normal disposition, DISP=(,x), was not CATLG or KEEP. KEEP can be used only when the STKKEEP parameter is set to Y in the CTTPARM member.
98	The volume count was set to a value other than 1.
99	A NOSTACK DD statement was set in the step.
9A	The allocation performed by the Batch Stacking utility (CTTSBD).

Real-Time Data Set Stacking Under JES3

JES3 normally issues all tape mount requests in immediate mode at the beginning of a job. However, it is possible to implement Real-time data set stacking under JES3.

In order to implement Real-time data set stacking mount requests under JES3, the mount requests must be intercepted and modified. Use JES3 sample Exit IATUX06 to perform the necessary modifications.

When a job starts, Exit IATUX06 analyzes all tape requests in the job. The exit changes mount requests to DEFERRED mode and issues a message if:

■ The data set that is to be created is a candidate for stacking.
■ The mount request is in immediate mode (meaning, DEFER is not specified).

When the data set is created, CONTROL-M/Tape searches for an appropriate volume and issues a mount message.

A data set is a candidate for stacking if all of the following are true:

■ The request is for a scratch tape.

■ CONTROL-M/Tape is active and real-time data set stacking is enabled (meaning, the DYNSTK installation parameter is set to Y).

■ A corresponding CONTROL-M/Tape rule has been defined and is active. This rule must include a DO STACK=Y statement.

— NOTE ————————————————————————————————

Under JES3, the DO STACK=Y statement can only be specified with selection criteria ON DATASET, ON JOBNAME and/or ON USERID.

Implementation

Use the following steps to implement real-time data set stacking under JES3:

1 Edit the ASMIAT06 member in the CTT JCL library and submit the job. When the job is submitted, the ASMIAT06 member compiles and links JES3 Exit IATUX06. Exit IATUX06 is called by JES3 when each DD statement is processed.

2 Copy the new IATUX06 module to the JES3 exits library (SYS1.JES3LIB).

3 To activate the new exit, stop and restart JES3 using Hot Start (an IPL is not required).

External Data Managers

This chapter includes the following topics:

Overview

External Data Managers (EDMs) are programs that manage a specific set of volumes according to internal criteria. EDMs determine retention of the volumes they control and can optionally relate to one physical file as more than one logical file.

CONTROL-M/Tape currently supports various EDMs such as DFSMShsm, CA-Disk (formerly DMS/OS), and CA-ASM2. Each of these EDMs has its own method of naming and tracking data sets and volumes that are under its control. CONTROL-M/Tape allows the EDM at your site to manage and expire EDM-controlled volumes, while CONTROL-M/Tape tracks activity and supervises access of these volumes. When an EDM-controlled data set or volume is scratched, the EDM notifies CONTROL-M/Tape through a user exit, and CONTROL-M/Tape updates its Media Database accordingly.

EDM volumes are identified to CONTROL-M/Tape through DO RETENTION=EDM statements in CONTROL-M/Tape rule definitions.

Below is a sample CONTROL-M/Tape rule that identifies EDM controlled volumes. For more information about rule definition, the *CONTROL-M/Tape User Guide.*

Figure 34   Sample CONTROL-M/Tape Rule

```
RULE: DFHSM    LIB CTT.PROD.RULES                              TABLE: EDM
 COMMAND ===>                                               SCROLL===> CRSR
 -------------------------------------------------------------------------
   RULE NAME    DFHSM     GROUP                        MODE PROD (Prod/Test)
   OWNER        M72       SEQUENCE PRIORITY    CONTINUE SEARCH Y   (Y/N)
   DESCRIPTION
   DOCMEM       DFHSM     DOCLIB CTT.PROD.DOC
   =======================================================================
   ON DATASET   = HSM*                                       And/Or/Not
   =======================================================================
   DO RETENTION = EDM                                        And/Or
   DO POOL      = DFHSM-TAPES
   DO
```

BMC Software recommends that you implement the CONTROL-M/Tape interface to the EDM at your site while operating CONTROL-M/Tape in Global Test mode. When CONTROL-M/Tape is activated in Global Phased, or Global production mode, the interface to the EDM at your site must be active.

The EDM interface enables CONTROL-M/Tape to detect when the EDM scratches a tape, so that CONTROL-M/Tape can update the Media Database accordingly.

EDM volumes are managed at the volume level (meaning, no data set specific control is used).

If more than one data set is stored on an EDM volume, only the first data set on the volume is recorded in the Media Database.

If a data set spans more than one EDM volume, volume chaining is not recorded in the Media Database. Each volume containing part of the data set is recorded as a single (unchained) volume containing only that data set.

An EDM is allowed to create data sets only on scratch volumes, or on volumes that are already marked as EDM-controlled. If an EDM creates a data set on a scratch volume, that volume is then identified by CONTROL-M/Tape as an EDM volume. Only an EDM is allowed to modify EDM volumes.

Information about EDM volumes listed in the Media Database can be displayed online through the Inquiry/Update screen (screen TI). For more information on the Inquiry/Update screen, see the online facilities chapter of the CONTROL-M/Tape User Guide.

Data sets stored on EDM volumes are normally expired through a command from the EDM (meaning, not by instructions from CONTROL-M/Tape or the other tape management system) according to the expiration mode (see "Expiration Modes for EDM Volumes").

_____ **NOTE** _____

EDM volumes can also be expired manually through the CONTROL-M/Tape utility CTTMUP. For more information, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide.*

_____

The EDM interface is implemented through a user exit of the EDM. This exit enables CONTROL-M/Tape (and optionally another tape management system) to detect when data sets or volumes are marked scratch by the EDM. Sample user exits for each EDM supported by CONTROL-M/Tape are supplied with CONTROL-M/Tape. The user exit used for each interface and the steps needed for its implementation of interfaces for the various EDMs are described on the following pages.

CONTROL-M/Tape messages beginning with CTTEDM describe the operations performed through this interface.

Expiration Modes for EDM Volumes

The expiration mode for an EDM volume is defined as either immediate (IMMED) or deferred (DEFRD) in the sample user exit for that EDM volume. Default: Deferred.

If the mode is defined as deferred:

■ The EDM volume is marked in the CONTROL-M/Tape Media database as pending scratched. The actual scratch is performed by the CTTRTM utility as part of the normal daily run of CONTROL-M/Tape.

■ The volser of the scratched volume appears in the daily scratch report, but you must wait until after the next run of the CTTRTM utility to use the physical tape.

If the expiration mode is defined as immediate:

■ The EDM volume is immediately marked in the CONTROL-M/Tape Media database as scratched after it expires.

■ The physical tape is immediately made available for use, but the volser for the scratched volume does not appear in the daily scratch report.

To change the default mode from IMMED to DEFRD:

■ While editing the sample user exit for the EDM interface you are implementing (as described in the following pages for implementing each EDM interface), search in the sample exit for the &EXPMODE parameter and change its value from D to I.

■ As part of the editing of the sample user exit, continue compiling the exit using the ICE Automatic Exit Installation Tool. For details about this tool, see the exits chapter of the *INCONTROL for z/OS Administrator Guide.*

DFSMShsm and ADSM Support

The CONTROL-M/Tape interfaces for DFSMShsm and ADSM (ADSTAR Distributed Storage Manager) are identical. The same members and steps are used for both of these EDMs. However, for easier reading, the steps shown below mention only DFSMShsm.

The ARCTVEXT member in the IOA SAMPEXIT library is called by DFSMShsm whenever a tape volume no longer contains valid data. The exit marks the volume as scratch in the Media Database and, optionally, interfaces with an automated tape library at the site.

Figure 35   DFSMShsm Calling the ARCTVEXT Member

Use the following steps to implement the CONTROL-M/Tape to DFSMShsm interface:

1 If you are currently not using Exit ARCTVEXT, continue with Step 2 below.

If this exit is already in use at your site (meaning, by another tape management system), use the following steps to integrate your current ARCTVEXT exit with CONTROL-M/Tape's exit in Global Test and Global Phased modes. You should stop using your other product's ARCTVEXT exit when you first activate CONTROL-M/Tape in Global Production mode.

A Rename the load module of the ARCTVEXT exit currently in use at your site. You cannot have two exits with the same name in the DFSMShsm LOAD library.

B Change all occurrences of keyword $TMSEXT$ in the ARCTVEXT sample member that is supplied with CONTROL-M/Tape to the exit name you chose in Step A.

C "Uncomment" the lines marked *CALLEXIT by replacing the asterisk in the first column with a space.

2 Install the DFSMShsm interface using the ICE Automatic Exit Installation Tool to compile the ARCTVEXT member. For details about this tool, see the exits chapter of the *INCONTROL for z/OS Administrator Guide.*

The EDM now calls the ARCTVEXT exit supplied with CONTROL-M/Tape that in turn calls the old ARCTVEXT (that has been renamed).

Figure 36   DFSMShsm Calling the ARCTVEXT Member Supplied with CONTROL-M/Tape

DFSMShsm receives a return code from the exit that communicates with the old tape management system. (This exit was originally named ARCTVEXT.)

3 Verify that the IOA LOAD library is defined as one of the DFSMShsm STEPLIB libraries or as one of the system's LINKLIST libraries.

4 Make sure that DO RETENTION=EDM statements exist in rules for the data sets created by DFSMShsm, including the CDS backup data sets. This statement indicates that the data sets indicated in the rule's selection criteria are EDM-controlled. Job names, data set names and program names can be used as selection criteria by the rules. The following rule can be used:

```
ON DATASET = * AND
ON PGM = ARCCTL
DO RETENTION = EDM
```

— **NOTE** —————————————————————
ADSM invokes deletion Exit ARCTVEXT when it releases a tape. This exit, which is invoked in the ADSM address space, is identical to the ARCTVEXT exit used by DFSMShsm.
————————————————————————————

To disable the old ARCTVEXT exit and replace it with the new ARCTVEXT exit, issue the following commands in this order:

```
SETSYS EXITOFF(ARCTVEXT)
SETSYS EXITON(ARCTVEXT)
```

You can use the CTTSYNC utility to list all inconsistencies between the Media database and the DFSMShsm OCDS file. You can run this utility occasionally, just to ensure that the two databases are synchronized.

CA-Disk (Formerly DMS/OS)

Use the steps described below to activate the CA-Disk interface to CONTROL-M/Tape.

The TMSCTLEX exit is called by CA-Disk whenever a tape volume no longer contains any valid data. The exit marks the volume as scratch in the Media Database and, optionally, interfaces with the automated tape library at the site.

Figure 37   CA-Disk Calling the TMSCTLEX Member

1 If you are currently not using the TMSCTLEX exit, continue with Step 2 below.

If this exit is already in use at your site (meaning, by another tape management system), use the following steps to integrate your current TMSCTLEX exit with the CONTROL-M/Tape exit in Global Test and Global Phased modes. You should stop using your other product's TMSCTLEX exit when you first activate CONTROL-M/Tape in Global Production mode.

   A Rename the load module of the TMSCTLEX exit currently in use at your site. You cannot have two exits with the same name in the CA-Disk LOAD library.

   B Change all occurrences of keyword $TMSEXT$ in the TMSCTLEX sample member that is supplied with CONTROL-M/Tape to the exit name you chose in step A.

   C "Uncomment" the lines marked *CALLEXIT by replacing the asterisk in the first column with a space.

2 Install CA-Disk Support using the ICE Automatic Exit Installation Tool to compile the TMSCTLEX member. For details about this tool, see the exits chapter of the *INCONTROL for z/OS Administrator Guide.*

The EDM now calls the TMSCTLEX exit supplied with CONTROL-M/Tape that in turn calls the old TMSCTLEX (that has been renamed).

Figure 38   CA-Disk Calling the TMSCTLEX Member Supplied with CONTROL-M/Tape
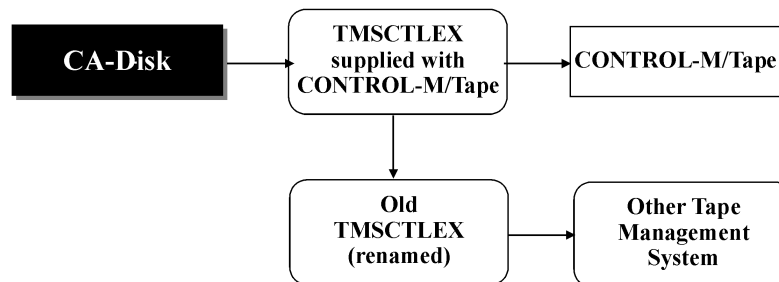
CA-Disk receives a return code from the exit that communicates with the old tape management system. (This exit was originally named TMSCTLEX.)

3 Verify that the IOA LOAD library is defined as one of the CA-Disk STEPLIB libraries or one of the system's LINKLIST libraries.

4 Make sure that DO RETENTION=EDM statements are included in rules for the data sets created by CA-Disk. This statement indicates that the data sets indicated in the selection criteria of the rule are EDM-controlled. Job names, data set names, program names, or volsers can be used as selection criteria by the rules.

CA-ASM2 Support

CONTROL-M/Tape and CA-ASM2 interface through CA-ASM2 Exit $FTEXIT (the Free Tape Exit). CA-ASM2 passes control to this exit before freeing a tape. In the sample for this exit supplied with CONTROL-M/Tape (the AS2FTEXT member in the IOA SAMPLE library), the CONTROL-M/Tape is called to expire the volume being freed (that is, to mark it SCRATCH in the CONTROL-M/Tape Media Database).

— **NOTE** —
CONTROL-M/Tape does not need to communicate with CA-ASM2 Exit $NTEXIT (New Tape). If CONTROL-M/Tape is the only tape management product installed at your site, verify that NONE is specified for the &TAPEMGT parameter of this exit before it is compiled.

Use the following steps to activate the CA-ASM2 interface for CONTROL-M/Tape:

1 Define all CA-ASM2 controlled tapes as belonging to specific tape pools of CONTROL-M/Tape (meaning, CONTROL-M/Tape pools in which all tapes are controlled by CA-ASM2).

Definition of tape pools is not related to the value of the $TAPPOOL CA-ASM2 installation parameter. Tape pools must be defined for CA-ASM2 tapes regardless of whether CA-ASM2 tape pools are enabled. Pool definitions under CONTROL-M/Tape ensure that only CA-ASM2 SCRATCH tapes are used by CA-ASM2 jobs.

2 If the $TAPPOOL parameter is equal to X'01' (meaning, CA-ASM2 tape pools are enabled), skip to Step 3 (below). Otherwise, define rules that instruct CONTROL-M/Tape to use only tapes from these pools for data sets created by CA-ASM2.

The data set names in the rules you define must be identical to those that appear in MOUNT messages for the relevant volumes. If you changed the "Dummy" data set name (written as the first file on each CA-ASM2 tape), use the new name in the rules as well.

3 Use the ICE Automatic Exit Installation Tool to compile the $FTEXIT member. For details about this tool, see the exits chapter of the *INCONTROL for z/OS Administrator Guide*. The $FTEXIT member is called by CA-ASM2 whenever a tape volume no longer contains valid data. The exit marks the volume as scratch in the Media Database and, optionally, interfaces with the automated tape library at the site.

Figure 39   CA-ASM2 Calling Exit $FTEXIT
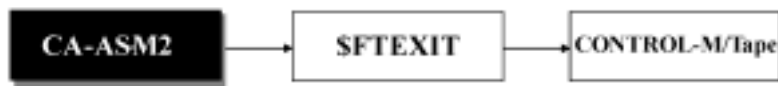
If you are currently not using Exit $FTEXIT, continue with Step 4 below.

If this exit is already in use at your site (that is, by another tape management system), use the following steps to integrate your current $FTEXIT exit with CONTROL-M/Tape's exit in Global Test and Global Phased modes. You should stop using your other product's $FTEXIT exit when you first activate CONTROL-M/Tape in Global Production mode.

A Rename the load module of the $FTEXIT exit currently in use at your site. You cannot have two different exits with the same name in your CA-ASM2 LOAD library.

B Change all occurrences of keyword $TMSEXT$ in the $FTEXIT sample member that is supplied with CONTROL-M/Tape to the exit name you chose in Step A.

C "Uncomment" the lines marked *CALLEXIT by replacing the asterisk in the first column with a space.

D Run the ASMFTEXT job (described above).

CA-ASM2 now calls the $FTEXIT exit supplied with CONTROL-M/Tape that in turn calls the old $FTEXIT (that has been renamed).

Figure 40   CA-ASM2 Calling Exit $FTEXIT Supplied with CONTROL-M/Tape

CA-ASM2 receives a return code from the exit that communicates with the old tape management system. (This exit was originally named $FTEXT.)

4 Verify that the IOA LOAD library is defined as one of the STEPLIB libraries or one of the system's LINKLIST libraries.

5 Make sure that DO RETENTION=EDM statements are specified in rules for the data sets created by CA-ASM2. This statement indicates that the data sets indicated in the selection criteria of the rule are EDM-controlled. Job names, data set names, program names, or volsers can be used as selection criteria by the rules.

ExHPDM Support

Use the steps described below to implement the CONTROL-M/Tape to ExHPDM interface.

1 The SOVCTTEX exit is called by ExHPDM whenever a tape volume no longer contains valid data. The exit marks the volume as scratch in the Media Database and, optionally, interfaces with an automated tape library at the site.

2 Install ExHPDM Support using the ICE Automatic Exit Installation Tool to compile the SOVCTTEX member. For details about this tool, see the exits chapter of the *INCONTROL for z/OS Administrator Guide*.

Verify that the IOA LOAD library is defined as one of the ExHPDM STEPLIB libraries or as one of the system's LINKLIST libraries.

3 Make sure that DO RETENTION=EDM statements are specified in rules for data sets created by ExHPDM. This statement indicates that the data sets indicated in the rules selection criteria are EDM-controlled. BMC Software recommends that you include the ON PGM=SOVMAIN statement as a selection criteria in the rules.

4 Verify that ExHPDM PTF L1P013W has been applied.

5 Specify the following statement in the ExHPDM startup parameter file: TMS(CONTROLT)

Automated Tape Library Interface and Virtual Tape Server

This chapter includes the following topics:

Overview

Sites with a large number of tape volumes typically use an automated tape library to help manage their tapes.

Most automated tape libraries consist of the following components:

Table 18   Automated Tape Library Components

Component	Description
Automated tape library hardware	Machine that stores and automatically mounts volumes (tapes).
Automated tape library database	Database containing the status of each volume (that is, SCRATCH or ACTIVE), its location in the automated tape library, and the pool name assigned to it (in automated tape libraries where pools are supported). For IBM devices, this database is call the Library Manager Database (LM DB).
Automated tape library software	Software that controls the automated tape library hardware. Some tasks performed by automated tape library software components are: ■ Detecting volume mount messages. ■ Locating a volume in the library according to the information in the automated tape library database. ■ Instructing the hardware to mount a volume. ■ Maintaining correct volume status in the automated tape library database. ■ Providing an application interface (API) to the automated tape library functions.

CONTROL-M/Tape manages volume status, vaulting, pool assignment and so on, for all the volumes in the site. Therefore, it is important that CONTROL-M/Tape and the automated tape library communicate with each other. This communication is performed through a CONTROL-M/Tape automated tape library interface.

CONTROL-M/Tape automated tape library interfaces are bidirectional (meaning, communication can be initiated either by CONTROL-M/Tape or by the automated tape library software).

CONTROL-M/Tape usually initiates the communication using the automated tape library API. For example, when a volume is scratched by CONTROL-M/Tape, CONTROL-M/Tape uses the API of the automated tape library to request to mark it as scratch in the automated tape library database.

The automated tape library usually initiates the communication using one of its exits. For example, when a volume is ejected by the automated tape library, an exit is invoked to announce this event.

Interface Types

Functions of the automated tape library interface may be implemented in either of the following ways:

- Through an interface supplied with CONTROL-M/Tape

  — This type of interface usually consists of a automated tape library interface module that accesses the automated tape library database through an automated tape library API.

  — Automated tape library exits are also supplied with CONTROL-M/Tape. These exits enable CONTROL-M/Tape to obtain control of tape processing at certain key points (for example, volume ejection).

  The interface module and sample exits can be customized to reflect the needs of your site.

- Through an interface supplied with the automated tape library

  This type of interface usually consists of a batch utility that is added to the CONTROL-M/Tape New Day procedure. This utility reads the Media Database through a CONTROL-M/Tape API and updates volume status in the automated tape library database accordingly.

  Many vendor-provided interfaces automatically recognize CONTROL-M/Tape mount and keep messages (for example, CTT101A and CT102A).

This chapter describes the automated tape library interfaces provided with CONTROL-M/Tape. For information about the interfaces provided by an automated tape library vendor, see the relevant documentation.

Interface Functions

Table 19 on page 126 lists various automated tape libraries and the functions supported for each library. Each function is identified by a number and one or more function indicators. For detailed descriptions of the functions, see "Function Descriptions" on page 126.

NOTE

Certain functions can be implemented by both the CONTROL-M/Tape interface and the vendor-provided automated tape library interface. However, to prevent unnecessary waste of system resources, BMC Software recommends that you do not implement any functions through both interfaces at the same time.

Table 19   Automated Tape Library Functions

Automated Tape Library Hardware	Automated Tape Library Software	Function[a]											
		1	2	3	4	5	6	7	8	9	10	11	12
StorageTek silo, including VSM	HSC	T[b]	T	T	T	T	T	T	T	N[c]	N	T	N
StorageTek silo, including VSM	CSC	T[b]	N[c]	N	N	N	T	N	N	N	N	A[d]	N
IBM ATL and VTS, or other library compatible with DFSMS	DFSMS	T[b]	T	T	T	T	A[d]	T	T	T	T	T	T
IBM ATL	BTLS	T[b]	T	T	T	T	A[d]	N[c]	N	N	N	A	N
SUTMYN (formerly Memorex Telex)	LMS	T[b], V[e]	T	T	T	T	V	N[c]	T	N	N	A[d]	N
ADIC (formerly EMASS/GRAU)	HACC	T[b], V[e]	T	T	T	T	V	T	N[c]	N	N	A[d]	V
FUJITSU MTL	LIBSP	T[b]	T	T	T	N[c]	V	N	T	N	N	A[d]	N
Comparex	HAS	V[e]	N[c]	N	V	N	V	N	N	N	N	A[d]	N

[a] Not all the functions are available for every automated tape library.

[b] T indicates that the function is supported by the CONTROL-M/Tape interface.

[c] N indicates that the function is not supported or not relevant.

[d] A indicates that the function is supported automatically; no interface is necessary.

[e] V indicates that the function is supported by the vendor-provided automated tape library interface.

Function Descriptions

The numbers of the following function descriptions correspond to the function numbers in Table 19 on page 126.

1. Set volume status to SCRATCH during batch processing. When a utility (for example, CTTRTM, the CONTROL-M/Tape retention management utility) scratches volumes, the status of the volume is set to SCRATCH in the automated tape library database.

2. Set volume status to Scratch according to real-time and online tape processing. When a volume is scratched during real-time processing (for example, due to immediate release by an EDM) or through command E in the CONTROL-M/Tape Inquire/Update screen (Screen TI), the status of the volume is set to SCRATCH in the automated tape library database.

3. Set volume status to ACTIVE during online processing. When a volume is unscratched through command X in the CONTROL-M/Tape Inquire/Update screen (Screen TI), the status of the volume is set to ACTIVE in the automated tape library database.

4. Eject volumes during batch processing. When CTTVTM (the CONTROL-M/Tape vault management utility) indicates that volumes in the automated tape library should be moved to a new location, the volumes are ejected from the automated tape library.

5. Eject volumes during online processing. When a volume is manually vaulted through command V in the CONTROL-M/Tape Inquire/Update screen (Screen TI), the volume is ejected from the automated tape library.

6. Interpret Mount and Keep messages issued by CONTROL-M/Tape (such as CTT100A, and CTT101A) to the automated tape library so that they are handled in the same way as Mount and Keep messages issued by MVS (for example, IEF233A or IEC501A). This function also includes interpretation of the POOL name in message CTT101A (or CTT104A for JES3) to ensure that a volume from the appropriate pool is mounted.

7. Monitor volumes ejected from or inserted in the automated tape library and update the IN-ATL indication for these volumes in the Media Database. This function usually also includes recording (in the Media Database) information about the internal location of a volume in the automated tape library.

8. Batch synchronize volume status (that is, SCRATCH, or ACTIVE) and location information (that is, whether or not the volume is in the automated tape library) in the Media Database and the automated tape library database. This function is performed through the CTTSYNC utility. For more information about the CTTSYNC utility, see the CONTROL-M/Tape utilities chapter of the *INCONTROL for z/OS Utilities Guide.*

   This function usually also includes recording (in the Media Database) information about the internal location of a volume in the automated tape library.

9. Monitor changes to volume status (for example, from ACTIVE to SCRATCH) in the automated tape library database that are made directly using the automated tape library software. In order to avoid synchronization problems, the change to a volume's status is allowed by CONTROL-M/Tape only if it complies with the status of that volume in the Media Database.

10. Handle requests for volumes not in the automated tape library.

   When a volume not in the automated tape library is needed, CONTROL-M/Tape indicates the volume's location outside the library (for example, the vault name) and prompts the operator to insert the volume into the automated tape library before the mount request is issued. The operator can decide to insert the volume to the automated tape library or to ignore the prompt.

If the prompt is ignored, the mount request for the volume specifies a tape drive that is outside the automated tape library and the tape has to be mounted manually.

> **NOTE**
>
> This function should only be implemented at sites where all mount requests are normally handled by the automated tape library.

Implementing this function at a site that often requires mounts outside the automated tape library results in unnecessary messages.

11. Allow CONTROL-M/Tape utility CTTTPI to initialize tapes in the automated tape library. For more information about this utility, see the CONTROL-M/Tape utilities chapter in the *INCONTROL for z/OS Utilities Guide.*

12. Set a volume's status in the automated tape library database (that is, SCRATCH or ACTIVE) according to its status in the Media Database when it is inserted in the automated tape library.

How CONTROL-M/Tape Interacts With the Automated Tape Library

As mentioned above, interaction between CONTROL-M/Tape and the automated tape library can be initiated by either CONTROL-M/Tape or the automated tape library software. Interaction initiated by CONTROL-M/Tape is discussed below. Interaction initiated by the automated tape library is discussed in the reference manual for your automated tape library software.

The CONTROL-M/Tape automated tape library interface is managed by a central interface module. This module receives requests for actions related to the automated tape library. Figure 41 illustrates how these requests are processed for a site with two IBM libraries and one StorageTek library.

Figure 41   CONTROL-M/Tape Interaction With Automated Tape Library
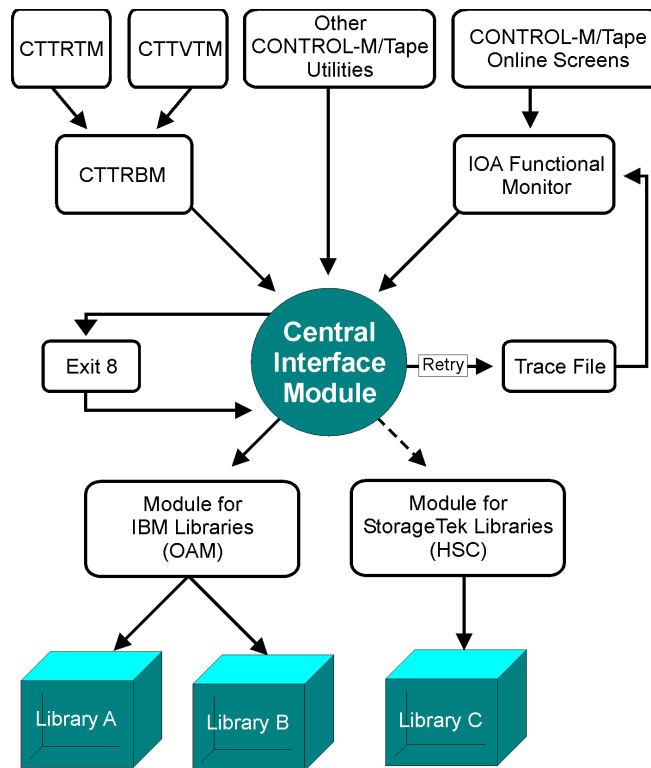
The central interface module receives requests from the following CONTROL-M/Tape components (discussed below):

■ Module CTTRBM
■ CONTROL-M/Tape Utilities
■ IOA Functional Monitor

Before performing each request, the central interface module consults CONTROL-M/Tape Exit 8. If the requested action is allowed by Exit 8, the central interface module sends the request to the interface module for the specific automated tape library.

**NOTE**
If a request to the automated tape library cannot be processed immediately, the request is written to the CONTROL-M/Tape Trace file. The request is then retrieved from the Trace file by the IOA Functional monitor that redirects the request to the Central Interface module.

The CTTRBM Module

This module receives command files generated by the CTTRTM and CTTVTM utilities and issues requests to the central automated tape library interface module according to the information in these files.

Information from the CTTRTM command file is used to generate requests to change volume status to SCRATCH.

Information from the CTTVTM command file is used to generate requests to EJECT a volume.

For more information about the CTTRTM and CTTVTM utilities, see the CONTROL-M utilities chapter of the *INCONTROL for z/OS Utilities Guide*.

CONTROL-M/Tape Utilities

Certain CONTROL-M/Tape utilities require access to the automated tape library interface so that they can update information in the automated tape library database. All relevant CONTROL-M/Tape utilities are APF-authorized and therefore can access the automated tape libraries directly through the interface modules.

The following utilities may pass requests to the central interface module:

Table 20   CONTROL-M/Tape Utilities

Utility	Description
CTTTPI	Tape initialization, mapping and erasure.
CTTSYNC	Synchronize the Media database with other software databases.
CTTMUP	Manual update of tape information (for example, change of tape status).

For more information about these utilities, see the CONTROL-M utilities chapter of the *INCONTROL for z/OS Utilities Guide*.

IOA Functional Monitor

The IOA Functional monitor is used to direct certain types of requests to the central interface module. These requests include:

■ Requests from CONTROL-M/Tape online screens.
■ Retry requests.

— **NOTE** _____

If the IOA Functional monitor is not installed and active, automated tape library requests from the online screens and retry requests are not processed. For more information, see the *INCONTROL for z/OS Installation Guide*, and "Sites With No IOA Functional Monitor Installed" on page 133.

Requests From CONTROL-M/Tape Online Screens

Most automated tape libraries require APF authorization for action requests. However, the CONTROL-M/Tape online screens do not have APF authorization. For this reason, requests for automated tape library access from an online screen must be routed to the IOA Functional monitor, which invokes an APF-authorized environment and sends the necessary requests to the central interface module.

Requests from an online screen may indicate that a tape should be scratched, activated or ejected, due to an option in the CONTROL-M/Tape Inquire/Update screen.

Retry Requests

If an automated tape library interface module fails to access the automated tape library, the failure is detected by CONTROL-M/Tape and a retry request for this operation is sent to the IOA Functional monitor through the Trace file. The IOA Functional monitor then starts a retry mechanism that attempts to pass the request to the automated tape library through the central interface module. Retry requests are submitted for an action until either a successful attempt or a retry limit is reached.

___ *NOTE* _____

A retry is not attempted if the failure is "volume not found".

Exit 8, described below, can be used to limit the number of times a specific action can be retried.

Exit 8: Automated Tape Library Request/Retry Confirmation

CONTROL-M/Tape Exit 8 can be used to accept or reject each action requested through the automated tape library interface.

Exit 8 (CTTX008) is invoked when:

- A command is about to be sent from CONTROL-M/Tape to an automated tape library.
- A retry is about to be initiated for an automated tape library request.

Information Passed to the Exit

The following information is passed to the exit each time it is invoked:

- The type of automated tape library from which the action is requested.

■ The action to be performed. The following basic commands may be requested:

— Mark a tape as SCRATCH
— Mark a tape as ACTIVE
— EJECT a tape
— QUERY tape information

■ The location of a record containing additional information (for example, volser of the relevant volume, from and to locations in case of an eject command used to move a volume).

— NOTE —

If the current invocation of the exit is to confirm whether a request should be retried, the last return code and reason code of the failed command from the automated tape library and the retry count for the request are also passed to Exit 8.

If more than one type of automated tape library is used at your site, Exit 8 is invoked separately for each type before the automated tape library is accessed. For more information, see "Sites With More Than One Type of Automated Tape Library" on page 132.

For more information about Exit 8, see the CTTX008 member in the IOA SAMPEXIT library.

Sample Uses For Exit 8

Sample uses for Exit 8 are:

■ To limit the number of times a specific request can be retried.

■ To reject EJECT requests from vaults that reside in (or are part of) an automated tape library.

■ To confirm (allow) EJECT requests only if they are from the CONTROL-M/Tape Active library (MAINLIB). (For a sample exit that performs this function, see the CTTX008W member in the IOA SAMPEXIT library.)

■ To reject retry requests when the previous action failed with a specific return code and/or reason code. For example, Exit 8 may confirm retry requests only if the previous failure was not a permanent one.

Sites With More Than One Type of Automated Tape Library

■ CONTROL-M/Tape can interface with a maximum of four different types of automated tape libraries.

- At a site with more than one library, automated tape library action requests are sent to each automated tape library until the request is satisfied.

- Exit 8 is called separately before each automated tape library is accessed. The exit can be used to reject commands for volser ranges that are not relevant to the automated tape library, thereby saving valuable processing time. For example, if all the volumes with a given volser prefix are stored in an IBM automated tape library, Exit 8 can be used to suppress actions for volsers with this prefix when requested from a StorageTek library.

NOTE

SMS-managed automated tape library from different vendors are considered as one library (meaning, Exit 8 is called only once for all SMS-managed automated tape libraries.

Sites With No IOA Functional Monitor Installed

- As mentioned earlier in this chapter, the IOA Functional monitor is used both to pass requests for automated tape library actions from CONTROL-M/Tape online screens, and to retry previously failed requests.

- If the IOA Functional monitor is not installed at your site, and you do not intend to implement it, Exit 8 can be used to reject requests from the Online environment and retry requests from all the environments, thereby saving valuable space in the Trace file (that is used to store these requests until the monitor processes them).

- It is recommended that you disallow retry requests at sites that do not use an IOA Functional monitor. To do this, edit sample Exit 8 in the CTTX008R member in the IOA SAMPEXIT library, and specify that 0 retries should be allowed.

NOTE

This sample exit can also be used at sites using an IOA Functional monitor to limit the number of retries to any desired number.

Interface Modules for Specific Vendors

When a request for an automated tape library function has been allowed by Exit 8 (described above), the central interface module passes the request to a module that is used to interface with a specific automated tape library.

> **— NOTE —**
> If more than one automated tape library type is in use at your site, a different interface module is used for each automated tape library. Each request is sent to one automated tape library interface module at a time, until either executed or rejected for all the automated tape library modules.

CONTROL-M/Tape automated tape library interface modules use basic commands supported by the automated tape library API to perform certain tasks. For example, to scratch a volume, CONTROL-M/Tape first uses the query command to verify that the volume is in the automated tape library and then uses the scratch command to scratch it.

The following basic commands are used by CONTROL-M/Tape:

Table 21   CONTROL-M/Tape Basic Commands

Command	Description
SCRATCH	Sets a volume's status to SCRATCH
ACTIVE	Sets a volume's status to ACTIVE
EJECT	Ejects a volume
QUERY	Queries a volume's status

> **— NOTE —**
> Since only a base level API is used, the CONTROL-M/Tape interface to the automated tape library should not be affected if the automated tape library software is upgraded.

To perform the above commands, CONTROL-M/Tape uses a different interface module for each type of automated tape library.

The following table lists the interface modules that are provided with CONTROL-M/Tape:

Table 22   CONTROL-M/Tape Interface Modules

Module	Hardware Supported	Software Supported
CTTRSTK	StorageTek silo and VSM	HSC
CTTRCSC	StorageTek silo and VSM	CSC
CTTOAM	IBM ATL or IBM VTS or any OAM compatible tape library.	OAM
CTTBTLS	IBM ATL	BTLS
CTTMMRX	SUTMYN libraries (formerly called MEMOREX/Telex)	LMS

Table 22   CONTROL-M/Tape Interface Modules

Module	Hardware Supported	Software Supported
CTTHACC	ADIC (formerly EMASS/GRAU)	HACC
CTTFUJI	FUJITSU MTL	LIBSP

—— *NOTE* ———————————————————————————————

The interface modules listed above are provided as samples. If necessary, they can be customized to comply with your site's operating procedures.

No functions supported for Comparex libraries are initiated by CONTROL-M/Tape. Therefore, no interface module is necessary for the CONTROL-M/Tape/Comparex interface.

Specific Implementations

The remainder of this chapter contains descriptions of the CONTROL-M/Tape interfaces for each of the supported automated tape library types. The description of each automated tape library-specific interface is followed by the detailed steps necessary for implementation of the interface.

StorageTek Silo and Virtual Storage Manager (VSM)

CONTROL-M/Tape can interface with either StorageTek's Host Software Component (HSC) or the Client Server Component (CSC). Follow the procedure appropriate for your site.

—— *NOTE* ———————————————————————————————

A retry is not attempted if the failure is "volume not found".

If Expert Library Manager (ExLM) software is used at your site, additional steps have to be performed to ensure that it is compatible with CONTROL-M/Tape. For more information see "ExLM Support" on page 140.

StorageTek Silos Managed by HSC

1 Specify HSC as one of the values for the RBTTYPE parameter in the CTTPARM member (through CONTROL-M/Tape step 2.10 in ICE).

2 Use the ICE Automatic Exit Installation Tool to compile the CTTRSTK member. For details about this tool, see the exits chapter in the *INCONTROL for z/OS Administrator Guide.*

3 Save the CTTRTM procedure under the name CTTRTM2. Rename the CTTRTMB procedure in the procedure library to CTTRTM. The new CTTRTM procedure contains an additional step (CTTRBM) that interfaces with the automated tape libraries.

4 Save the CTTVTM procedure under the name CTTVTM2. Rename the CTTVTMB procedure in the procedure library to CTTVTM. The new CTTVTM procedure contains an additional step (CTTRBM) that interfaces with the automated tape libraries.

5 CONTROL-M/Tape uses the HSC API to communicate with the automated tape library and to update the HSC Control Datasets. If the HSC load library (SLS.SLSLINK) is not in the LINKLIST, it should be added to the STEPLIB DD statement of all procedures that access the automated tape library. These procedures include:

- the CTTRBM step in the CTTRTM and CTTVTM utilities
- the CTTSYNC utility
- the IOA Functional Monitor procedure (IOAFMON)

— **NOTE** —————————————————————————————

In order to add the required library to the STEPLIB, edit the procedure of the utility at IOA.PROCLIB library, remove the line 'INCLUDE MEMBER=&IOAENV' and instead add the following lines:

```
//STEPLIB DD DISP=SHR,DSN=&STEPLIB
//        DD DISP=SHR,DSN=robotic-tape-library-load-library
//DAPARM  DD DISP=SHR,DSN=&ILPREFA..PARM
//        DD DISP=SHR,DSN=&ILPREFA..IOAENV
```

If you have implemented EDM support (for example, using Exit ARCTVEXT for DFSMShsm or Exit TMSCTLEX for CA-Disk), the HSC load library should be added to the DFSMShsm, or CA-Disk procedure STEPLIB.

6 User Exit SLSUX06 (Volume Insert/Delete) can, optionally, be installed to manage the update the IN-ATL status for volume records in the CONTROL-M/Tape Media Database. This exit also stores information about the location of each volume in the silo (the LSM address) in the appropriate volume record in the Media Database.

Sample code for this user exit is located in the SLSUX06 member in the IOA SAMPEXIT library.

7 Use the following steps to implement this exit:

A Use the CONTROL-M/Tape utility CTTSYNC to set the IN-ATL indication and LSM address for all volume records in the Media Database. This utility is described in detail in the CONTROL-M/Tape utilities chapter of the *INCONTROL for z/OS Utilities Guide.*

B Use the ICE Automatic Exit Installation Tool to compile the SLSUX06 member. For details about this tool, see the exits chapter in the *INCONTROL for z/OS Administrator Guide.*

C Verify that Exit SLSUX06 is enabled in the HSC environment.

HSC and CONTROL-M/Tape Mount Messages

Use the following step to implement scratch pooling in your StorageTek Silo:

1 Specify M or Y for the DYNWTO parameter in the CTTPARM member (through CONTROL-M/Tape step 2.2 in ICE). This causes CONTROL-M/Tape to include the name of a scratch pool in the mount messages.

2 Ensure that HSC scratch pool definitions (defined through the HSC's SCRPOOL initialization statements) are compatible with CONTROL-M/Tape pool definitions.

HSC SCRPOOL statements are less flexible than CONTROL-M/Tape pool definitions. Therefore, only CONTROL-M/Tape pools that can also be defined to HSC should be defined (for example, do not use masking characters in pool definitions).

HSC does not allow scratch pool names that are more than 13 characters in length. Therefore, pool names of 13 characters or less should be used in CONTROL-M/Tape.

3 Use the SLSUX01 HSC job processing user exit to interpret CONTROL-M/Tape mount messages.

A Use the ICE Automatic Exit Installation Tool to compile the SLSUX01 member. For details about this tool, see the exits chapter in the *INCONTROL for z/OS Administrator Guide.*

B Ensure that Exit SLSUX01 is enabled in HSC.

CTTTPI Interface to HSC

The initialization program of the StorageTek Host Software Component invokes a site-specific media initialization program. To indicate that you want to use the CTTTPI utility for volume initialization, follow the instructions for the cartridge initialization utility in the StorageTek reference manual. For more information, see the description of the CTTTPI utility in the CONTROL-M utilities chapter of the *INCONTROL for z/OS Utilities Guide.*

StorageTek Silo Managed by CSC

1 Specify CSC as one of the values for the RBTTYPE parameter in the CTTPARM member (through CONTROL-M/Tape step 2.10 in ICE).

2 Use the ICE Automatic Exit Installation Tool to compile the CTTRCSC member. For details about this tool, see the exits chapter in the *INCONTROL for z/OS Administrator Guide*).

3 Save the CTTRTM procedure under the name CTTRTM2. Rename the CTTRTMC procedure in the procedure library to CTTRTM. The new CTTRTM procedure contains an additional step (CTTRBM) that interfaces with the StorageTek Silo.

4 Allocate a sequential file as a fixed block with a record length of 80 bytes. Use the value specified for the %OLPREFT% parameter in the DEFPARM member to name this file as follows:

```
olpreft.DASCRCMD
```

This sequential file should be large enough to hold the maximum number of volumes that might be expired by the CTTRTM utility in one day (one record per volume).

> **_NOTE_**
>
> StorageTek CSC cannot perform automatic ejects. After running the CTTVTM utility, all necessary ejects must be performed manually.

No application Program Interface (API) is supplied with StorageTek CSC. For this reason CONTROL-M/Tape uses the SCUADMIN CSC utility to notify CSC about expired tapes. As a result of this method of operation, note the following:

CSC is not notified when a volume status is modified manually from the CONTROL-M/Tape Online environment or through the CTTMUP utility.

When an External Data Manager (EDM) is set to scratch volumes immediately, CSC is not notified of the scratched tapes. It is therefore recommended that the EDM exit (for example, ARCTVEXT for DFSMShsm) scratch volumes in deferred mode. When deferred mode is used, EDM volumes are given the status PENDING SCRATCH by the EDM exit, and are scratched by the CTTRTM utility the next time it is run, at which time CSC is notified.

CSC and CONTROL-M/Tape Mount Messages

Use the following step to implement scratch pooling in your StorageTek Silo:

1 Specify M or Y for the DYNWTO parameter in the CTTPARM member (through CONTROL-M/Tape step 2.2 in ICE). This causes CONTROL-M/Tape to include the name of a scratch pool in the mount messages.

— *NOTE* —————————————————————————————————

If you are not using scratch pools under CONTROL-M/Tape, specify N for the DYNWTO parameter in the CTTPARM member so that the mount message is not changed by CONTROL-M/Tape.

———

2 Use the SCSUX01 CSC job processing user exit to interpret the pool name in the CONTROL-M/Tape mount messages.

A Edit the SCSUX01 member in the IOA SAMPLE library. Locate the POOLTAB table at the bottom of the exit. List each CONTROL-M/Tape pool name with the associated CSC pool index number and save the member.

In the following example, the POOL-1 CONTROL-M/Tape pool is associated with CSC pool index number 1 and the POOL-2 CONTROL-M/Tape pool is associated with CSC pool index number 2:

```
POOLTAB   CSCPOOL TYPE=START
          CSCPOOL NAME=POOL-1,INDEX=1
          CSCPOOL NAME=POOL-2,INDEX=2
           CSCPOOL TYPE=END
```

B Use the ICE Automatic Exit Installation Tool to compile the SCSUX01 member. For details about this tool, see the exits chapter in the *INCONTROL for z/OS Administrator Guide.*

C Copy the SCSUX01 exit (compiled in the previous step) to the CSC LOAD library.

ExLM Support

Expert Library Manager (ExLM) software from StorageTek is a utility that enhances control over a number of aspects of your tape management library (for example, the availability of scratch volumes). When this utility is run, it internally executes a CONTROL-M/Tape module (CTTXLM) that provides information necessary for ExLM's functioning.

If you are not using the ExLM software, ignore this topic.

The interface between CONTROL-M/Tape and ExLM is performed by utilizing the TMX CTT control statement of ExLM. For more information about how to use this ExLM control statement, please refer to the *ExLM System Administrator's Guide*.

NOTE

For ExLM 6.0.0, you must apply ExLM PTF L1L00DO, and for ExLM 6.1.0 you must apply ExLM PTF L1l00DB.

As described in the *ExLM System Administrator's Guide,* you need to perform the following steps to let ExLM access the CONTROL-M/Tape Media Database:

1 Add the IOA LOAD library to the STEPLIB DD statement of the ExLM JCL. This is not required if you have already added the IOA LOAD library to the MVS LNKLST.

2 Add the following DD statement to the ExLM JCL:

```
//DAPARM   DD DISP=SHR,DSN=&ILPREFA.PARM
//         DD DISP=SHR,DSN=&ILPREFA.IOAENV
```

NOTE

Change &ILPREFA to the IOA installation library prefix.

3 Add a DD statement for the Media Database data component to the ExLM JCL, as follows:

```
//LCMTMSDB DD DISP=SHR,DSN=&DBPREFT.MDBD.E000
```

NOTE

Change &DBPREFT to the CONTROL-M/Tape database prefix that was set during installation.

IBM Automatic Tape Library (ATL) and Virtual Tape Server (VTS)

CONTROL-M/Tape can interface with either IBM libraries managed by OAM, or IBM Basic Tape Library Support (BTLS). Follow the procedure appropriate for your site.

IBM Libraries managed by DFSMS

> _NOTE_
>
> The instructions provided below should be used for implementation of an interface with any OAM-managed automated tape library (regardless of the vendor).

1 Specify OAM as one of the values for the RBTTYPE parameter in CTTPARM (through CONTROL-M/Tape step 2.10 in ICE).

2 Save the CTTRTM procedure under the name CTTRTM2, and rename the CTTRTMB procedure in the procedure library to CTTRTM.

3 The new CTTRTM procedure contains a step (CTTRBM) that activates the interface to the IBM automated tape libraries.

4 Save the CTTVTM procedure under the name CTTVTM2, and rename the CTTVTMB procedure in the procedure library to CTTVTM.

5 The new CTTVTM procedure contains a step (CTTRBM) that activates the interface to the IBM automated tape libraries.

6 Use the ICE Automatic Exit Installation Tool (described in the exits chapter of the _INCONTROL for z/OS Administrator Guide_) to compile the CTTOAM member. CTTOAM contains the code necessary for interfacing with the IBM OAM-managed automated tape libraries software.

User Exits

The sample user exits in Table 23 (located in the IOA SAMPEXIT library) can optionally be installed as part of the CONTROL-M/Tape to OAM interface.

> _NOTE_
>
> After compiling and linking the following sample exits, put the output modules in the LNKLST, as stated in the relevant IBM DFSMS Object Access Method documentation.

Table 23   Sample user exits (part 1 of 2)

Exit	Description
CBRUXCUA	**Change Use Attribute** Allows a change in the use attribute of a volume (SCRATCH to ACTIVE and vice versa) only if this change has already been recorded in the Media Database. Implementation of this exit helps maintain Media Database integrity.
CBRUXEJC	**Tape Eject** Turns off the IN-ATL status bit in the volume record of ejected volumes.

CBRUXENT	**Tape Entry**
	
	This exit does the following:
	
	■ Turns on the IN-ATL status bit in the volume record of the inserted volume.
	
	■ Updates the internal location (in the automated tape library) in the volume record of the relevant volume in the Media Database.
	
	■ Sets the initial use attribute of the volume (that is, SCRATCH or ACTIVE) in the automated tape library to the status as indicated by the relevant volume record in the Media Database.
	
	If the volume is not defined in the Media Database the status is set to ACTIVE (default).
	
	However, if the automated tape library is shared with another environment (for example, another CONTROL-M/Tape environment with a separate Media Database), it may be necessary to allow the other environment to set the volume's status.
	
	If it is necessary to allow the other environment to set the volume's status, do not compile and link the exit before changing the &NOTINCTT parameter setting from P (PRIVATE) to I (IGNORE), as follows:
	
	In the sample Exit CBRUXENT, in the IOA SAMPLE library, change.
	`&NOTINCTT SETC 'P'`
	– to –
	`&NOTINCTT SETC 'I'`

	Note: This sample sets the RECORDING-TECHNIQUE field (UXEREC) to UNKNOWN (that is, to UXENOREC) if no information is available. BMC Software recommends that you set your own default value by modifying the line marked @TRT. Valid values are listed after the UXENOREC label in the SYS1.MODGEN (CBRUXEPL) member.

Table 23   Sample user exits (part 2 of 2)

Exit	Description
CBRUXVNL	Volume Not In Library Issues a message to the operator with the volume location (as recorded in the Media Database). On receipt of this message, the operator can insert the volume into the automated tape library and reply R (retry) to continue.
	Note: This exit should only be implemented at sites where all mount requests are normally handled by the automated tape library. Implementing this exit at site that often requires mounts outside the automated tape library, results in unnecessary messages.

IBM Libraries With Basic Tape Library Support (BTLS)

1 Specify BTLS as one of the values for the RBTTYPE parameter in CTTPARM (through CONTROL-M/Tape step 2.10 in ICE).

2 Edit the CTTBTLS member in the IOA SAMPEXIT library and make the following changes:

   A Assign one of the BTLS library units to the BTLSUNIT parameter:

```
BTLSUNIT EQU   C'123'   <=== DEFINE AUTOMATED TAPE LIBRARY
UNIT ADDRESS
```

   B If you are using 4-digit device addresses, change the value specified for the BTLSDIGS parameter from 3 to 4 using the following statement:

```
BTLSDIGS EQU 4 <=== NUM OF DIGITS IN UNIT ADDR (3/4)
```

Example

If 1AB2 is the address of one of your automated tape library units, the parameters section should include the following statements:

```
BTLSUNIT EQU   C'1AB2'   <=== DEFINE AUTOMATED TAPE LIBRARY UNIT ADDRESS
BTLSDIGS EQU   4         <=== NUM OF DIGITS IN UNIT ADDRESS (3/4)
```

3 Use the ICE Automatic Exit Installation Tool (described in the exits chapter of the *INCONTROL for z/OS Administrator Guide*) to compile the CTTBTLS member. The CTTBTLS member contains the code necessary for interfacing with the IBM automated tape library.

4 Add BTLSIN and BTLSOUT DD statements to the CTTRBM step in the procedures for the CTTVTM and CTTRTM utilities.

- The BTLSIN DD statement must point to a temporary file.
- The BTLSOUT DD statement must point to a SYSOUT file.

Example

If SYSDA is used as a temporary DASD unit, and BTLS messages should be printed to the default MSGCLASS SYSOUT class, the above mentioned DD statements should be as follows:

```
//BTLSIN   DD  UNIT=SYSDA,SPACE=(TRK,1)
//BTLSOUT  DD  SYSOUT=*
```

5 Add the BTLSIN and BTLSOUT DD statements (described above) to the IOA functional Monitor procedure.

6 Add the BTLSIN and BTLSOUT DD statements (described above) to your CTTMUP procedure to ensure support for functions VOLSCR and GRPSCR of the CTTMUP utility.

SUTMYN Library Managed by LMS

Use the following steps to implement the CONTROL-M/Tape interface to a SUTMYN automated tape library (formerly called MEMOREX/Telex) at your site.

> ___ **NOTE** _____
> A batch interface between CONTROL-M/Tape and a SUTMYN automated tape library that synchronizes the CDS (that is, the automated tape library database) with the CONTROL-M/Tape Media Database can also be implemented at your site through an exit supplied with the SUTMYN automated tape library software (LMS). For more information, see your SUTMYN documentation.

1 Specify SUTMYN as one of the values for the RBTTYPE parameter in the CTTPARM member (through CONTROL-M/Tape step 2.10 in ICE).

2 Use the ICE Automatic Exit Installation Tool (described in the exits chapter of the *INCONTROL for z/OS Administrator Guide*) to compile the CTTMMRX member. The CTTMMRX member contains the code necessary for interfacing with the SUTMYN ATL software (LMS).

3 Save the CTTRTM procedure under the name CTTRTM2. Rename the CTTRTMB procedure in the procedure library to CTTRTM. The new CTTRTM procedure contains an additional step (CTTRBM) that interfaces with LMS.

4 Save the CTTVTM procedure under the name CTTVTM2. Rename the CTTVTMB procedure in the procedure library to CTTVTM. The new CTTVTM procedure contains an additional step (CTTRBM) that interfaces with LMS.

5 Adjust procedures that access the automated tape library.

CONTROL-M/Tape uses the LMS API to access the automated library and to update the LMS Control Dataset (CDS). If the LMS load library is not in the MVS linklist, it should be added to the STEPLIB DD statement of all procedures that access the automated tape library.

The list of procedures that may access the automated library includes:

- the CTTRBM step in the CTTRTM and CTTVTM utilities
- the CTTSYNC utility
- the IOA Functional Monitor procedure (IOAFMON)

— **NOTE** —

In order to add the required library to the STEPLIB, edit the procedure of the utility at IOA.PROCLIB library, remove the line 'INCLUDE MEMBER=&IOAENV' and instead add the following lines:

```
//STEPLIB DD DISP=SHR,DSN=&STEPLIB
//        DD DISP=SHR,DSN=robotic-tape-library-load-library
//DAPARM  DD DISP=SHR,DSN=&ILPREFA..PARM
//        DD DISP=SHR,DSN=&ILPREFA..IOAENV
```

6 If you have implemented EDM support (for example, using the ARCTVEXT exit for HSM or the TMSCTLEX exit for SAMS:Disk), the LMS load library should be added to the HSM, or SAMS:Disk STEPLIB procedure.

ADIC Automated Tape Libraries Managed by HACC

Use the following steps to implement the CONTROL-M/Tape interface to an ADIC (formerly EMASS/GRAU) automated tape library at your site:

— **NOTE** —

A batch interface between CONTROL-M/Tape and the HACC software that synchronizes the CDS (that is, the automated tape library database) with the CONTROL-M/Tape Media Database can also be implemented at your site through an exit supplied with the HACC software. For more information, see the *HACC Installation and Customization Reference.*

1 Specify HACC as one of the values for the RBTTYPE parameter in the CTTPARM member (through CONTROL-M/Tape step 2.10 in ICE).

2 Use the ICE Automatic Exit Installation Tool (described in the exits chapter of the *INCONTROL for z/OS Administrator Guide*) to compile the CTTHACC member. The CTTHACC member contains the code necessary for interfacing with the HACC software.

3 Save the CTTRTM procedure under the name CTTRTM2. Rename the CTTRTMB procedure in the procedure library to CTTRTM. The new CTTRTM procedure contains an additional step (CTTRBM) that interfaces with HACC.

4 Save the CTTVTM procedure under the name CTTVTM2. Rename the CTTVTMB procedure in the procedure library to CTTVTM. The new CTTVTM procedure contains an additional step (CTTRBM) that interfaces with HACC.

5 Adjust procedures that access the automated tape library.

CONTROL-M/Tape uses the HACC API to access the automated tape library and to update the HACC Control Dataset (CDS).

■ If the HACC load library is not in the LINKLIST, it should be added to the STEPLIB DD statement of all procedures that access the automated tape library.

■ If the HACC parameters are defined in another library other than SYS1.PROCLIB, then the following DD card should be added:

```
HACCPARM DD DSN=dsname,DISP=SHR
```

where *dsname* is the library where the HACPARM1 member is searched, or

```
HACCPARM DD DSN=dsname(memname),DISP=SHR
```

where *dsname* is the library and *memname* is the member that contain HACC parameters.

■ The following DD card should also be added to all the environments that may access the library:

```
HACCOUT  DD  SYSOUT=*
```

The list of procedures that may access the automated tape library includes:

■ the CTTRBM step in the CTTRTM and CTTVTM utilities
■ the CTTSYNC utility
■ the IOA Functional Monitor procedure (IOAFMON)

> *NOTE*
>
> In order to add the required library to the STEPLIB, edit the procedure of the utility at IOA.PROCLIB library, remove the line 'INCLUDE MEMBER=&IOAENV' and instead add the following lines:

```
//STEPLIB DD DISP=SHR,DSN=&STEPLIB
//        DD DISP=SHR,DSN=robotic-tape-library-load-library
//DAPARM  DD DISP=SHR,DSN=&ILPREFA..PARM
//        DD DISP=SHR,DSN=&ILPREFA..IOAENV
```

If you have implemented EDM support (for example, using the ARCTVEXT exit for DFSMShsm or the TMSCTLEX exit for CA-Disk), the HACC load library should be added to the DFSMShsm, or CA-Disk procedure STEPLIB.

6 Implement HACC exits.

CONTROL-M/Tape uses HACC Insert and Eject exits to update the IN-ATL status in volume records of the Media Database. Implement these exits through the following steps:

A Use the ICE Automatic Exit Installation Tool (described in the exits chapter of the *INCONTROL for z/OS Administrator Guide*) to compile the CTTHACVI (the Insert exit) and CTTHACEJ (the Eject exit) members.

B Include the expressions VIEXIT=CTTHACVI and EJEXIT=CTTHACEJ in the HACPARM statements in the HACPARM installation library.

C Add the IOA LOAD library to the STEPLIB DD statement of the HACC procedure.

FUJITSU MTLs Managed by LIBSP

Use the following steps to implement the CONTROL-M/Tape interface to a FUJITSU automated tape library at your site:

> *NOTE*
>
> The CONTROL-M/Tape interface to LIBSP can be installed only after the LIBSP support for the CONTROL-M/Tape mount messages is installed. Contact your LIBSP vendor for more information.

1 Specify FUJITSU as one of the values for the RBTTYPE parameter in the CTTPARM member (through CONTROL-M/Tape step 2.10 in ICE).

2 Edit the CTTFUJI member in the IOA SAMPLE library. Locate the following lines:

```
*********************************************************************
*        PLEASE SET THE LIBVER PARM BELOW:                          *
*             1 - FOR LIBSP V1                                      *
*             2 - FOR LIBSP V2                                      *
*********************************************************************
&LIBVER  SETC  '1'       <=== CHANGE - LIBSP RELEASE (1/2)
```

Set the &LIBVER parameter to '1' if you are using LIBSP V1. Set this parameter to '2' for LIBSP V2 or higher.

3 Use the ICE Automatic Exit Installation Tool (described in the exits chapter of the *INCONTROL for z/OS Administrator Guide*) to compile the CTTFUJI member. The CTTFUJI member contains the code necessary for interfacing with the LIBSP software.

4 Save the CTTRTM procedure under the name CTTRTM2. Rename the CTTRTMB procedure in the procedure library to CTTRTM. The new CTTRTM procedure contains an additional step (CTTRBM) that interfaces with LIBSP.

5 Edit the CTTVTMF member in the IOA PROCLIB library. Locate the following lines:

```
//*
//*  FUJITSU LIBSP LIBRARY UTILITY
//*
//VTMFUJI  EXEC PGM=KBLLIBU,COND=(4,LE,EJCTCHK)  <== CHANGE (LIBSP V1)
//*TMFUJI  EXEC PGM=KJJLIBU,COND=(4,LE,EJCTCHK)  <== CHANGE (LIBSP V2)
//KBLCDS1  DD DISP=SHR,DSN=SYS1.LIBSP.CDS1        <== CHANGE/REMOVE
//KBLCDS2  DD DISP=SHR,DSN=SYS1.LIBSP.CDS2        <== CHANGE/REMOVE
```

6 Set the PGM name according to the LIBSP level you are using:

- PGM=KBLLIBU for LIBSP V1

- PGM=KJJLIBU for LIBSP V2 or above

- If you are using LIBSP V1, modify the CDS name in the KBLCDS1 and KBLCDS2 DD statements to the name of your CDS. A KBLCDS2 DD statement is needed only if you are using DUAL CDS OPERATION. If this is not the case, the KBLCDS2 DD statement should be removed from the procedure.

- If you are using LIBSP V2 or above, remove both KBLCDS1 and KBLCDS2 DD statements from the CTTVTMF member.

7 Save the CTTVTMF member.

8 Save the CTTVTM procedure under the name CTTVTM2. Rename the CTTVTMF procedure (edited in the previous step) in the procedure library to CTTVTM. The new CTTVTM procedure contains a step (CTTRBM) that interfaces with LIBSP.

9 Adjust procedures that access the automated tape library.

CONTROL-M/Tape uses the LIBSP API to access the automated tape library and to update the LIBSP Control Dataset (CDS). If the LIBSP load library is not in the MVS linklist, it should be added to the STEPLIB step of all procedures that access the automated tape library.

The following procedures may access the automated tape library:

- the CTTRBM step in the CTTRTM and CTTVTM utilities
- the CTTSYNC utility
- the IOA Functional Monitor procedure (IOAFMON)
- if you have implemented EDM support (for example, using the ARCTVEXT exit for DFSMShsm, or the TMSCTLEX exit for CA-Disk), the LIBSP load library should be added to the DFSMShsm or CA-Disk procedure STEPLIB, as appropriate.

— **NOTE** —

In order to add the required library to the STEPLIB, edit the procedure of the utility at IOA.PROCLIB library, remove the line 'INCLUDE MEMBER=&IOAENV' and instead add the following lines:

```
//STEPLIB DD DISP=SHR,DSN=&STEPLIB
//        DD DISP=SHR,DSN=robotic-tape-library-load-library
//DAPARM  DD DISP=SHR,DSN=&ILPREFA..PARM
//        DD DISP=SHR,DSN=&ILPREFA..IOAENV
```

If you are using LIBSP V1, add the following DD statements to the above procedures:

```
//KBLCDS1  DD DISP=SHR,DSN=SYS1.LIBSP.CDS1
//KBLCDS2  DD DISP=SHR,DSN=SYS1.LIBSP.CDS2
```

Note that KBLCDS2 is needed only if DUAL CDS OPERATION is used. If this is not the case, the KBLCDS2 DD statement should be removed.

10 Add the following DD statement (if it does not already exist) to the above procedures:

```
//DAPOOLS DD DISP=SHR,DSN=ilpreft.PARM($$POOL)
```

where *ilpreft* is the value specified for the %ILPREFT% parameter in the DEFPARM member. (Note that this DD statement can be copied from the CTTINIT procedure.)

11 Ensure that CONTROL-M/Tape and LIBSP use identical pool definitions. Note that LIBSP limits pool names to a maximum length of six characters. Therefore, pool names specified to CONTROL-M/Tape should not be longer than six characters.

Comparex Library Managed by HAS

The interface between CONTROL-M/Tape and HAS is implemented by the Comparex library vendor and is available for HAS version 2.2.1 and later.

Contact your automated tape library vendor for more information.

NOTE

When an External Data Manager (EDM) is set to scratch volumes immediately, HAS is not notified of the scratched tapes. It is therefore recommended that the EDM exit (such as ARCTVEXT for DFSMShsm) scratch volumes in deferred mode. When deferred mode is used, EDM volumes are given the status PENDING SCRATCH by the EDM exit, and are scratched by utility CTTRTM the next time it is run, at which time HAS is notified.

Export/Import Interface in a VTS Environment

VTS Export/Import Interface

VTS (Virtual Tape Server) logical volumes cannot be vaulted unless they are exported onto physical tapes. CONTROL-M/Tape automatically initiates the VTS Export/Import interface to export VTS logical volumes out of the VTS environment and to stack and vault those volumes onto physical tapes.

When exporting logical volumes, CONTROL-M/Tape groups together volumes with similar vaulting patterns. Each group is then written to separate physical tapes to be sent to different vaults, as necessary.

Logical volumes are grouped together for export using one of the following criteria:

■ if their first DO VAULT value and associated retention specification (UNTIL subparameter) are the same

■ only if the entire vaulting pattern for each logical volume is the same

The criteria used for grouping logical volumes are set with the TYPERUN MODE parameter in the VTSVLTIN member in the CTT PARM library. For more information, see "Implementing the VTS Export/Import Interface."

Implementing the VTS Export/Import Interface

To implement the VTS Export/Import interface, modify the CTTVTM procedure as follows:

1 Rename the CTTVTM procedure as CTTVTM2.

2 Rename the CTTVTMV procedure as CTTVTM. The new CTTVTM contains steps CTTVVM and CTTVEXP, that you need to modify (as described later in this procedure).

3 The VTSVLTIN member in the CTT PARM library contains control statements with the following syntax:

Table 24   The VTSVLTIN Member Control Statements

Statement	Description
TYPERUN MODE=[FIRSTVLT/ALLVLT]	TYPRUN MODE indicates how logical volumes are to be checked and grouped for export. Valid values are: FIRSTVLT indicates that logical volumes with the same first DO VAULT value and retention specification are grouped together for export. Default. ALLVLT indicates that only logical volumes with the same entire vaulting pattern are grouped together for export.
RANGE FROM=*beg_volser*,TO=*end_volser*	FROM specifies the beginning of the volume serial number (volser) range. TO specifies the end of the volser range.

4 Specify which TYPERUN MODE is used for exporting logical volumes (FIRSTVLT or ALLVLT). For example:

```
TYPERUN MODE=FIRSTVLT
```

— **NOTE** —

When grouping logical volumes by their entire vaulting patterns with the TYPERUN MODE=ALLVLT statement, only volumes currently located within the first 10 vaults in the vaulting pattern are compared. Logical volumes located in a vault beyond the 10th vault are not exported.

Grouping logical volumes by their first VAULT parameter and retention specification (TYPERUN MODE=FIRSTVLT) may prevent exclusion of logical volumes that are vaulted beyond the 10th vault.

For both TYPERUN MODEs, logical volumes that have non-specific retention specifications (such as MVS CATALOG or LAST ACCESS) are not grouped for export through VTS. Instead, each of these logical volumes are exported to their own separate tapes. This is to avoid the case where logical volumes would be grouped together on the same physical tape, but would possibly be required to be sent to different locations or on different dates due to the different values of their non-specific retention specifications.

Because logical volumes with non-specific retention specifications are exported to their own physical tapes, physical tapes within the VTS machine would be consumed faster than desirable. It is therefore recommended that you only export tapes with the VTS Export/Import Interface that have specific retention specifications (such as DATE or DAYS), by modifying the appropriate DO VAULT statements.

5 Specify the RANGE of volsers that reside in the Virtual Tape Server (VTS). Add additional RANGE statements as necessary. When CONTROL-M/Tape exports logical volumes, only tapes inside these ranges are compared for export. For example:

```
RANGE FROM=VOL001,TO=VOL005
RANGE FROM=VOL011,TO=VOL015
RANGE FROM=VOL021,TO=VOL025
```

Do the following in the CTTVVM step of the new CTTVTM procedure:

A Make the required changes in the EXPLIST DD statement.

The EXPLIST DD statement should refer to a scratch logical volser inside the VTS. This volser is the Export List Volume used by the VTS Export command.

B Make the required changes in the RESFILE and EXPSTAT DD statements.

These DD statements should refer to the same volser as in EXPLIST.

C Make the required changes in the IMPLIST DD statement.

The IMPLIST DD statement should refer to a scratch logical volser inside the VTS that is not the same scratch logical volser as referred to in step 5A. This volser is the Import List Volume produced during the VTS Export process.

D Make the required changes in the IMPSTAT DD statement.

The IMPSTAT DD statement should refer to the same volser as was referred to in the IMPLIST DD statement, in step 5C.

6 In step CTTVEXP of the new CTTVTM procedure, make the required changes to DD statement EXPSTAT. This DD statement refers to the same Export List Volume as referred to in DD statement EXPLIST in step CTTVVM.

VTS Export/Import Process

Based on the implementation of the VTS Export/Import interface, the VTS Export/Import process occurs as follows:

Daily Run of the CONTROL-M/Tape Vault Management Facility

Once the changes to the VTSVLTIN member and the changes to the CTTVVM and CTTVEXP steps of the CTTVTM procedure have been implemented, the procedures are executed as part of the normal daily run of the CONTROL-M/Tape vault management facility. This includes the entire CTTVTM utility (the CONTROL-M/Tape vault management utility) and the CTTRBM module. Steps CTTVVM and CTTVEXP run after the CTTRBM module runs.

> ___ *NOTE* _____
>
> If you run only one CTTVTM session within the CTTVTM utility, the distribution reports that are produced by this CTTVTM session contain both regular tapes and VTS logical tapes. When reading through these distribution reports, it is difficult for the operator to identify the VTS logical tapes that require vaulting.
>
> To avoid this problem, it is recommended that you run two different CTTVTM sessions, where the first session excludes all VTS tapes (using the EXCLUDE statement) while the second session includes only the VTS tapes (using the INCLUDE statement). Using this strategy, steps CTTVVM and CTTVEXP would only be run as a part of the second session. As a result, CTTVTM produces separate distribution reports that exclude and include VTS logical tapes, respectively.

For more information about the CTTVTM utility, see the CONTROL-M/Tape chapter of the *INCONTROL for z/OS Utilities Guide.* For more information about the CTTRBM module, see "The CTTRBM Module" on page 129.

The CTTVVM Step

From the list of tapes that were vaulted by the CTTVTM utility, CTTVVM selects logical volumes to be exported to physical tapes based on the value of TYPERUN MODE (either FIRSTVLT or ALLVLT) and the RANGE of volsers within the VTS, as defined in the VTSVLTIN member. Logical volumes that are not inside this RANGE or that were not moved from location 'mainlib' by CTTVTM are not compared for export.

CTTVVM uses the selected set of logical volumes to create the Export List Volume and the Import List Volume. The Export List Volume is used by step CTTVEXP to initiate the VTS Export command. The Import List Volume report contains a list of the physical volumes and the logical volumes that reside on them. The volumes on the Import List Volume are imported when the user later initiates the Import command, which is described in "Import Procedure" on page 154.

After the Import List Volume is produced, a message similar to the following is displayed at the console:

```
CTT347I IMPORT LIST VOLUME CREATED ON VOLSER VOL0011
```

The CTTVEXP Step

After the CTTVVM step finishes running, the CTTVEXP step initiates the Export command and the selected logical volumes are then written to physical tapes. This procedure may take some time, depending on the number of tapes to be written.

When all the tapes have been written, a message is issued by the OAM at the console indicating that the procedure has finished. Based on the information from the Export Status File that had been written by the VTS to the Export List Volume, the CTTVEXP step produces a report that lists the following:

■ All the exported logical volumes, their corresponding physical tapes, and the destination (vaults) of these tapes.

■ Any logical volumes that failed to be exported along with the reason for the failure.

Import Procedure

To import logical volumes back to the VTS environment, perform the following steps:

1 Select and then load the physical tapes onto the VTS based on the information in the Import List Volume.

2 Issue the Import command at the MVS console, referring to the volser as displayed in the CTT347I message during the CTTVVM step (see "The CTTVVM Step" above).

3 For more information on loading tapes and issuing the Import command, refer to the organization and administration chapter of the *CONTROL-M/Tape User Guide.*

Registering External (Foreign) Tapes

This chapter includes the following topics:

Overview

Data centers use various methods to track the storage location and external identification of removable media. Some data centers use a volume serial number to refer to a specific volume. Other data centers refer to tapes by slot IDs (corresponding to physical storage slots) or by volume groups (corresponding to application, and so on.)

CONTROL-M/Tape identifies volumes in its Media Database by volume serial number (volser). These volsers are usually physically recorded in a volume's internal label when the volume is initialized. Volsers should always be unique within a single site.

Many data centers regularly receive volumes from other sites. In some cases, these volumes may have the same volsers as volumes already in use at the data center. This creates a duplicate volser situation. The mechanism used by CONTROL-M/Tape to handle duplicate volsers is described under .

CONTROL-M/Tape enables users to check in external volumes, either through the Online facility, or through an Automatic Check-In process. These volumes are marked as External Volumes in the Media Database. They are processed through the same management, control, and protection procedures as local volumes. External volumes are considered a separate tape pool (call EXTERNAL). The CONTROL-M/Tape Retention Management utility (CTTRTM) lists the EXTERNAL pool separately in its Scratch report. This makes it easier to track expiration of external volumes.

When an external volume reaches its expiration date, it can either be deleted from the Media Database or it can be handled like regular volumes, which are marked SCRATCH but remain in the Media Database.

Traditional Handling of External Tapes

Most tape management systems ignore "external" volumes. When a data center receives volumes from other sites, these systems neither manage them (in terms of their usage or expiration) nor control their physical storage location within the data center. External volumes are not protected from being overwritten or from being used as SCRATCH volumes by these systems.

— **NOTE** —————————————————————————————

Some tape management systems allow external volumes to be manually checked in. However, even these systems do not properly protect external volumes (for example, by preventing files from being overwritten).

Security products used by most tape management systems for resident media are bypassed for external volumes. In these systems, external volumes are specified in job statements through the JCL parameter EXPDT=98000. This parameter indicates that the tape management system should ignore the action that follows and not to perform security checks on the volume. When volume checking is bypassed for external tapes, there is no way to prevent them from being overwritten or used as SCRATCH volumes.

CONTROL-M/Tape Handling of External Tapes

The CONTROL-M/Tape Check-in facility registers external tapes in the Media Database so that they can be managed, controlled, and protected in the same manner as local (resident) tapes. This process can be activated automatically when a tape is mounted, or manually through the online Check-In facility (Screen TC).

Automatic Check-In Process

The DYNVOL CONTROL-M/Tape installation parameter indicates how automatic check-in of volumes should be performed. When automatic check-in is activated, if a job attempts to access a volume that is not defined in the Media Database, CONTROL-M/Tape checks the value specified for the DYNVOL parameter and proceeds accordingly. Valid values for the DYNVOL parameter are:

Table 25   Values for the DYNVOL Parameter

Value	Description
P	A message is displayed prompting the operator to specify if a volume record should be added to the Media Database.
E	A volume record is added to the Media Database and the volume is marked as an External Volume. No message is sent to the operator.
Y	A volume record is added to the Media Database. The volume is not marked as an external volume. No message is sent to the operator.
I	The volume is ignored. Processing of the job continues without the intervention of CONTROL-M/Tape. No information is recorded in the Media Database regarding the volume or the data sets contained in that volume. (This value produces a result similar to the JCL parameter EXPDT=98000.)
N	The volume definition is not added to the Media Database and the job abends for specific tape requests, or the tape is rejected for nonspecific (scratch) requests.

> **— NOTE —**
>
> The DYNVOL parameter can also be set through a DO DYNVOL statement in a
> CONTROL-M/Tape rule.
>
> When a volume definition is added to the Media Database during the automatic check-in
> process, retention information is obtained from the corresponding JCL statement, a default
> CONTROL-M/Tape rule definition ($DEFAULT), or the default retention period specified
> through the DEFEXPDT CONTROL-M/Tape installation parameter.

External Volume Check-In Facility

The CONTROL-M/Tape External Volume Check-In screen, shown in Figure 42,
allows definition of external volumes for addition to the CONTROL-M/Tape Media
Database.

Figure 42   External Volume Check-In Screen

```
------------ CONTROL-M/TAPE EXTERNAL VOLUME CHECK-IN SCREEN  ------------(TC)
COMMAND ===>
+------------------------------------------------------------------------------+
| VOLSER      123456                      Locally assigned VOLSER              |
| SL-NAME     123456                      Internal volume label               |
| MEDIA TYPE  CART                        Type of media                       |
| LABEL TYPE  SL                          Type of label (SL/NL/NSL/AL)        |
| PRINT LABEL N                           (Y/N) Print gummed label?           |
| MVS CATALOG Y                           (Y/N) Catalog datasets?             |
| DEL EXPIRED                             (Y/N) Delete when expired?          |
| RETENTION   DAYS            0090        DAYs/DATe/Permanent/Catalog/Rules   |
| ADDITIONAL INFORMATION ------------------------------------------------------|
| DESCRIPTION INPUT DATASET               USER FIELD                          |
| VENDOR                                  OWNER                               |
| EXTERNAL VOLUME DATASET LIST ------------------------------------------------|
| DATASET# 01 DSN.INPUT.DATASET                                               |
| DATASET# 02                                                                 |
| DATASET# 03                                                                 |
| DATASET# 04                                                                 |
| DATASET# 05                                                                 |
+------------------------------------------------------------------------------+
```

During installation, a prefix for external volumes can be specified through the
EXTRNVOL parameter. When each external volume is checked in, it is assigned a
unique volser that is comprised of this prefix and a serial number. External volsers
can then optionally be used to sort external volumes (for example, they may be
arranged in slots whose numbers correspond to the serial numbers in the assigned
volsers).

The CONTROL-M/Tape External Volume Check-In screen contains fields specifying

- unique volume serial number (VOLSER)
- actual internal volume name (SL-NAME)
- media type
- label type
- retention period
- data set list
- additional volume list (for multivolume data sets)
- whether data sets in the data set list should be cataloged

— NOTE —

If specific data sets are listed in the External Volume Check-in screen, data set records are created (in the Media Database) for these data sets when the volume is checked in.

Retention period information is essential for retention management of external volumes. The DEL EXPIRED field specifies if a volume record is kept in the Media Database after the volume expires. If no value is specified for the DEL EXPIRED field, the external volume is kept in the Media Database after expiration.

For a more detailed description of the External Volume Check-In screen, see the online facilities chapter of the *CONTROL-M/Tape User Guide.*

Duplicate Volser Considerations

External volumes checked in to CONTROL-M/Tape sometimes have the same volser as a volume already in the CONTROL-M/Tape Media Database. This is problematic because the volser must be a unique identifier of a volume in the Media Database. To solve this problem, CONTROL-M/Tape uses two fields, VOLSER and SL-NAME (Standard Label Name) to identify volumes in the Media Database.

Table 26   VOLSER and SL-NAME

Volume Identifiers	Description
VOLSER	The VOLSER field is used to enter the logical volser in the Media Database. This is the unique volser assigned to the checked-in volume. When a volume is checked in, the value in the VOLSER field is used to identify and access the volume (for example, in JCL references, job statements, references in the MVS catalog, and mount messages).
	A logical volser can be automatically generated with the prefix specified in the EXTRNVOL installation parameter, or it can be specified manually in the External Volume Check-In screen. Assigning a unique logical volser does not affect the physical (internal) label on the volume in any way.

Table 26   VOLSER and SL-NAME

Volume Identifiers	Description
SL-NAME	The physical volser (Standard Label name) is stored in the SL-NAME field of a volume record. For local volumes, the SL-NAME and VOLSER are the same. For external volumes, the SL-NAME is used to reconcile the discrepancy between the requested volser, and the mounted volume's standard label, when they do not match.

When an external volume is checked in, a new logical volser is used to identify the volume. In addition, the original volser (on the volume's internal label) is stored in the SL-NAME field.

When a job requests a specific volume through a JCL statement, the operating system checks that the volser on the volume's internal label matches the requested volser.

If the requested volume and the internal label do not match, the operating system would normally reject the tape. However, when a volume is defined to CONTROL-M/Tape with different values in the VOLSER field and the internal label, CONTROL-M/Tape intervenes in the operating system processing. If the value in the SL-NAME field matches the volser in the internal label, CONTROL-M/Tape forces the operating system to accept the volume.

_____ *NOTE* _____

The special handling described above is supported only when tapes are accessed through a READ function. If a tape with a duplicate name is opened for WRITE access, the internal label of the tape (volume) is changed so that it matches the external name of the volume.

_____

Examples

Example 1

An external volume with an internal standard label of 111111 is delivered to the data center. The tape librarian checks in the tape and finds that there is already an existing volume with this volser in the Media Database. A unique value, NEW111, is assigned to the volume and entered in the VOLSER field. The original volser value (111111) is entered in the SL-NAME field.

When the volume is requested for processing, the JCL statement includes the parameter VOL=SER=NEW111. The operator mounts volume NEW111. Normally, the operating system would reject the mounted volume since the internal label (111111) does not match the requested volser (NEW111). However,

CONTROL-M/Tape performs its own validation checking routine. CONTROL-M/Tape determines that the value in the SL-NAME field (111111) matches the internal label of the mounted tape. CONTROL-M/Tape forces the operating system to accept the volume for processing.

Example 2

Every Monday morning a tape is delivered from the social security office with the same physical standard label (SS0001). The tape librarian checks in the tape using the External Volume Check-In screen and an automatically generated volser, as shown in Figure 43.

Figure 43   Check-in Screen

```
------------   CONTROL-M/TAPE EXTERNAL VOLUME CHECK-IN SCREEN   ------------(TC)
COMMAND ===>
+------------------------------------------------------------------------------+
| VOLSER      EXT045                       Locally assigned VOLSER             |
| SL-NAME     SS0001     +-------------------------------------+               |
| MEDIA TYPE  3490        |   PLEASE CONFIRM ADDING OF         |               |
| LABEL TYPE  SL          |   VOLUME EXT045 TO THE MDB Y (Y/N)  |L/AL)          |
| PRINT LABEL N          +-------------------------------------+1?             |
| MVS CATALOG Y                              (Y/N) Catalog datasets?           |
| DEL EXPIRED                                (Y/N) Delete when expired?        |
| RETENTION   DAYS            0090           DAYs/DATe/Permanent/Catalog/Rules |
| ADDITIONAL INFORMATION -----------------------------------------------------|
| DESCRIPTION SOCIAL SECURITY TAPE           USER FIELD                        |
| VENDOR                                     OWNER                             |
| EXTERNAL VOLUME DATASET LIST ------------------------------------------------|
| DATASET# 01 SS.INPUT.DATASET.D021298                                         |
| DATASET# 02                                                                  |
| DATASET# 03                                                                  |
| DATASET# 04                                                                  |
| DATASET# 05                                                                  |
+------------------------------------------------------------------------------+
```

A gummed label with the new logical volser (EXT045) is applied externally to the tape.

When online inquiries are made about the tape, the original volser (meaning, the SL-NAME) is entered in the Inquire/Update entry panel.

Figure 44   Inquire/Update Entry Panel

```
------------- CONTROL-M/TAPE - INQUIRE/UPDATE ENTRY PANEL ------------(TI)
COMMAND ==>
SELECT BY:
   MEDIA        ===>                        Media type
   DSNAME       ===>
   VOLSER       ===>           TO           Volser/Mask
   SL-NAME      ===> SS0001    TO           SL-Name/Mask
   POOL         ===>                        Pool name/Mask
   LOCATION     ===>                        Location name/Mask

SELECT BY DATE:
   CREATE FROM  ===>           TO           Creation date range
   EXPIRE FROM  ===>           TO           Expiration date range
   ACCESS FROM  ===>           TO           Last access date range

SELECT BY STATUS:
   ACTIVE       ===> Y                      VAULTED only ===> N
   SCRATCH      ===> Y                      EXTERNAL     ===> Y
   EDM CONTROL  ===> Y                      ATL/VTS only ===> N

DISPLAY OPTIONS:
   DISPLAY TYPE ===> V                      RECORD TYPE  ===>
```

All volumes with an SL-NAME of SS0001 are retrieved from the Media Database.

Figure 45   Retrieval List

```
DATABASE LIST < V / V  > ---------------------------------------------(TI)
COMMAND ===>                                              SCROLL===> CRSR
O VOLSER    VOLSEQ MEDIA       RETENTION  L-ACCESS   FILES LOCATION ---STATUS----
  EXT015           3400        01/08/01              0001 MAINLIB  Ext-Active
  EXT021           3400        01/15/01              0001 MAINLIB  Ext-Active
  EXT027           3400        01/22/01              0001 MAINLIB  Ext-Active
  EXT032           3400        01/29/01              0001 MAINLIB  Ext-Active
  EXT037           3400        02/05/01              0001 MAINLIB  Ext-Active
  EXT045           3400        02/12/01              0001 MAINLIB  Ext-Active
====== >>>>>>>>>>>>>>>   NO MORE ENTRIES IN THE LIST    <<<<<<<<<<<<<< ======
```

Retention of External Volumes

When checking in external volumes using the External Volume Check-In screen, the retention period is entered on the screen in the RETENTION field.

Valid retention values are:

Table 27   External Volume Check-in Values

Value	Description
DAYS	Volume is retained for a specified number of days.
DATE	Volume is retained until a specified date.
CATALOG	Volume is retained as long as any of its data sets are maintained by the MVS catalog.

Table 27   External Volume Check-in Values

Value	Description
PERMANENT	Volume is retained indefinitely.
RULES	Volume is retained as long as at least one of its data sets is retained. The retention and vault pattern for each data set listed in the EXTERNAL VOLUME DATASET LIST (of screen TC) is determined according to CONTROL-M/Tape rules. However, CONTROL-M/Tape must be active to use these rules.

After Expiration

When an external volume is due for expiration, it can either be physically deleted from the Media Database (and returned to its place of origin), or it can remain in the Media Database and be handled like a regular volume (meaning, it can be assigned a status of EXT-SCRATCH and can then be used as a scratch tape). Information about expired external volumes marked EXT-SCRATCH is saved in the Media Database, and can be retrieved as needed.

The DEL EXPIRED field (specified during check-in of an external volume) indicates if a volume should be physically deleted from the Media Database upon expiration. The default is not to delete the volume. Option D (Delete) of the Inquire/Update Screen can be used to delete an external volume from the Media Database after it has expired. Only volumes with a status of EXT-SCRATCH can be deleted from the Media Database with option D.

— NOTE

Records describing external volumes checked in through the Automatic Check-In facility are automatically deleted from the Media Database when the relevant volumes are expired. The DEL EXPIRED field is irrelevant for these volumes.

If you want to keep volumes with a status of EXT-SCRATCH in the Media Database, the labels of these volumes must be modified so that the volser and SL-name match. Label modification can be performed through the CTTTPI utility. Once the volumes are relabeled, they are treated as local volumes.

Implementation Steps

You can use the following step to implement CONTROL-M/Tape support for external volumes at your site:

Step 1 – Activate the Automatic Check-In Process

1. Specify (E,E) for the DYNVOL CONTROL-M/Tape parameter. This value causes volume records for external volumes that are checked in to be automatically added to the Media Database. It also instructs CONTROL-M/Tape to mark the volume being checked in as External (in the volume record in the Media Database).

2. Specify Y for the DYNDS CONTROL-M/Tape parameter to automatically add the data set records to the Media Database for the data sets listed in the External Volume Check-In screen.

— **NOTE** —————————————————————————————

Specifying Y for the DYNDS and DYNVOL CONTROL-M/Tape installation parameters causes volumes and data sets to be automatically defined any time an accessed volume or data set is not described in the Media Database. Therefore, these parameters do not only affect external volumes.

Step 2 – Activate Automatic Volser Generation

1. Specify a volser prefix in the EXTRNVOL CONTROL-M/Tape installation parameter to enable automatic generation of volsers in the External Volume Check-In screen.

2. Estimate the number of external tapes the data center receives and retains to determine the length of the prefix that should be specified (for example, a three character prefix allows a range of up to 999 volumes).

3. Choose a naming convention for external volumes if the automatic generation of volsers is not activated (that is, no value is specified for the EXTRNVOL parameter).

CONTROL-M/Tape DFSMS Interface

This chapter includes the following topics:

DFSMS Support

The CONTROL-M/Tape to DFSMS Interface enables you to:

■ determine the expiration date of a data set on a tape according to DFSMS Management Class definitions

■ use Management Class as a selection parameter in rule definitions (see ON MGMTCLAS in the rule parameters chapter of the *CONTROL-M/Tape User Guide*)

Implementation of the CONTROL-M/Tape to DFSMS interface consists of:

■ Storage and Management class definition in DFSMS.
■ adjusting ACS Routines
■ activation of the interface in CONTROL-M/Tape

Management Classes and Storage Classes

Management Classes - In order to enable CONTROL-M/Tape to identify DFSMS-managed tape data sets, Management classes must be defined for all these data sets. These management classes can be used as part of the selection criteria that trigger a CONTROL-M/Tape rule.

The following management class attributes are referenced by CONTROL-M/Tape to determine the retention for a DFSMS-managed data set:

■ Expiration attributes (Expire After Days Non-Usage, Expire After Date or Days)
■ Retention Limit
■ # GDG Elements On Primary

For more information regarding the CONTROL-M/Tape handling of DFSMS Management classes, see the description in the organization and administration chapter of the *CONTROL-M/Tape User Guide.*

Storage Classes - Ensure that each DFSMS-managed tape to be handled by CONTROL-M/Tape is assigned a DFSMS Storage class. DFSMS activates the Management Class ACS routine only if a Storage Class is assigned to the data set.

Activating CONTROL-M/Tape Support for DFSMS

To activate the DFSMS interface of CONTROL-M/Tape, perform the following steps:

1 Edit the CTTPARM member in the IOA PARM library:

A Specify Y for the SMSINTR parameter.

B Review the description of the OVERJCL installation parameter, and determine if its value should be changed.

C Save this member.

2 If CONTROL-M/Tape is active, refresh the installation parameters in memory. To do this, issue the following operator command:

```
S CTTINIT,PARM='MODE=RELOAD,TBLT=PARM'
```

If CONTROL-M/Tape is not active, changes to the CONTROL-M/Tape installation parameters are automatically loaded the next time CONTROL-M/Tape is started.

Optionally, you can define rules that use Management Class as a selection criteria (meaning, ON MGMTCLAS). If you define such rules, you must refresh the CONTROL-M/Tape rules in memory. To do this, issue the following operator command:

```
S CTTINIT,PARM='MODE=RELOAD,TBLT=RULE'
```

Adjusting ACS Routines

Below are sample adjustments to ACS routines that enable the CONTROL-M/Tape/DFSMS interface by assigning Management classes to relevant data sets.

Examples

Example 1

In this example, Management Class SHORTERM is assigned to all tape data sets that end with TEMP.

Note that the same Storage Class (ATLSTK) is assigned to all tape data sets. It is assigned only to enable DFSMS to invoke a Management Class ACS routine.

Figure 46   Storage Class Adjustments

```
/*******************************/
/* DEFINE TAPE UNIT NAMES      */
/*******************************/
FILTLIST TAPES INCLUDE('0420','0421','0460','0461')
/*****************************************/
/* SET A STORAGE CLASS FOR TAPE DATASETS  */
/*****************************************/
WHEN (&ACSENVIR='CTTOPEN' &&  &UNIT=&TAPES)
SET &STORCLAS = 'ATLSTK'
```

Figure 47   Management Class Adjustments

```
/****************************************************/
/* SET A MANAGEMENT CLASS FOR TAPE  '*.TEMP' DATASETS  */
/****************************************************/
WHEN (&ACSENVIR='CTTOPEN' &&  &LLQ='TEMP')
SET &MGMTCLAS = 'SHORTERM'
```

Example 2

In this example, tape data set DSN.WEEKLY is assigned to pool WEEKBKP, and Management Class KEEPMNTH is assigned to this data set in the CONTROL-M/Tape Media Database (MDB).

Note that the same Storage Class (CTTSC) is assigned to all tape data sets. It is assigned only to enable DFSMS invoke a Management Class ACS routine.

A different Management Class is assigned for each value of the &ACSENVIR parameter.

During mount processing for data set DSN.WEEKLY, Management Class WEEK is assigned to this data set. Rule 1 assigns pool WEEKBKP to this Management Class.

During open processing for this data set, Management Class KEEPMNTH is assigned to this data set and this information is recorded in the Media Database. Rule 2 causes the volume of this data set to be vaulted in vault SAFE for 10 days.

Figure 48   Storage Class Adjustments

```
/*****************************/
/* DEFINE TAPE UNIT NAMES     */
/*****************************/
FILTLIST TAPES INCLUDE('0420','0421','0460','0461')
/*****************************************/
/* SET A STORAGE CLASS FOR TAPE DATASETS  */
/*****************************************/
WHEN (&ACSENVIR='CTTOPEN' && UNIT=&TAPES)
SET &STORCLAS = 'CTTSC'
WHEN (&ACSENVIR='CTTMNTV' && UNIT=&TAPES)
SET &STORCLAS = 'CTTSC'
```

Figure 49   Management Class Adjustments

```
/***********************************************************/
/* SET A MANAGEMENT CLASS FOR TAPE  'DSN.WEEKLY' DATASETS   */
/***********************************************************/
WHEN (&ACSENVIR='CTTOPEN' &&  &DSN='DSN.WEEKLY')
SET &MGMTCLAS = 'KEEPMNTH'
WHEN (&ACSENVIR='CTTMNTV' &&  &DSN='DSN.WEEKLY')
SET &MGMTCLAS = 'WEEK'
```

Figure 50   CONTROL-M/Tape Rule 1

```
ON MGMTCLAS  = WEEK      And/Or/Not A
ON DATASET   = *
=======================
DO POOL      = WEEKBKP
```

Figure 51   =-M/Tape Rule 2

```
ON MGMTCLAS  = KEEPMNTH And/Or/Not A
ON DATASET   = *
=======================
DO VAULT     = SAFE
UNTIL DAYS 0010
```

Cartridge Message Display Customization

This chapter includes the following topics:

Overview

The CONTROL-M/Tape interface for displaying messages on cartridge magnetic tape subsystems allows you to

■ display the first seven characters of a pool name on the cartridge drive LCD display when a scratch tape is requested from a specific scratch pool

■ stop automatic cartridge load when two consecutive tape mounts result in the rejection of the mounted tapes

To enable this feature, the Cartridge Stack Loader (CSL) must be set to SYSTEM mode.

The IGXMSGEX Message Display Installation Exit enables you to customize messages to be displayed on an IBM 3490 tape drive. This exit is optional and is invoked only if it is link-edited with the Message Display Execution Module (IGX00030).

Installing the Message Display Interface

Installation of the message display interface is performed using the application of an SMP/E USERMOD to your MVS SMP/E environment. This USERMOD introduces two CONTROL-M/Tape CSECTs (IGXMSGEX and CTTMSGD) that are linked to the IGX00030 module in the LPA library.

— **NOTE** —————————————————————————————————
If another Message Display interface is installed already, remove the existing interface before installing the CONTROL-M/Tape interface.

The following steps are applied to your MVS SYS1.LPALIB library. You can apply these changes to your MLPA library instead by overriding the LPALIB DD statement, either through DDDEF or through your MVS SMP/E JCL procedure.

To install the CONTROL-M/Tape interface to the Message Display, perform the following steps:

1 Edit the IGXMSGEX sample member in the IOA SAMPEXIT library. The IGXMSGEX member contains a sample message display installation exit that allows control to be passed to several modules for customization of MVS messages before they are displayed on an IBM 3490 tape drive. All modules to which control is to be passed are listed under the MODLIST label in this sample member. By default, this list contains one CTTMSGD module, the CONTROL-M/Tape message customization module.

You can let other modules process tape drive messages in parallel with the CONTROL-M/Tape interface (for example, for parallel processing by CA-1) by adding an entry for each of these modules under the MODLIST label in the IGXMSGEX member. For further information see comments in this sample member for the format of module specifications.

It is recommended that you save a backup copy of the IGXMSGEXsample member before modifying it. All changes to this sample member must be saved before proceeding with step 2.

2 Use SMP/E online panels to find the Owning FMID of "MOD IGX00030" and write it down for reference in Step A.

3 Save a backup copy of the IGX00030 module before continuing with the next step. This module is located in your LPA library.

4 Edit the INSTMSGD member in the CONTROL-M/Tape JCL library. This member contains a job that uses SMP/E to compile the IGXMSGEX member and link it to the IGX00030 module.

5 Configure the job as follows:

   A Replace the FMID with the FMID obtained in 2.

   B Replace the SMP JCL procedure name with your site's MVS SMP/E JCL procedure.

   C Update the target zone name to reflect your MVS target environment name.

   D Add the IOA SMPPTS and IOA MAC libraries to your procedure's SYSLIB specification.

6 Submit the job. The job should complete with a return code of 0.

To activate the CONTROL-M/Tape message display interface, either IPL your system or use a system tool (for example, RESOLVE) to dynamically add the new IGX00030 module to your MLPA.

> **— NOTE —**
>
> If you have already implemented the CONTROL-M/Tape Message Display Interface and you want to update the IGXMSGEX member, repeat only step 4 using job REDOMSGD instead of job INSTMSGD.

Sort Programs Interface

This chapter includes the following topics:

Overview

CONTROL-M/Tape provides an interface with DFSORT and SyncSort. Before the sort program reads a data set that resides on a tape, it issues queries for the data set attributes, such as record length, block size, record format, and block count. Using the responses to these queries, the sort program improves its performance.

DFSORT Implementation

You can implement DFSORT by copying the CTTTPEX module from the IOA.LOAD library into the DFSORT load library, or to the LNKLST.

___ *NOTE* _____
During the copy process, change the name of the CTTTPEX module to ICETPEX.

SyncSort Implementation

You can implement SyncSort by copying the CTTSI module from the IOA.LOAD library into the SyncSort load library, or to the LNKLST.

Retrieving information from the Media database through ISPF

This chapter includes the following topics:

Overview

The CONTROL-M/Tape Inquire option (TI) is used to retrieve data from the Media database. You can use the Inquire option through ISPF option 3.4 (Data Set List utility). In order to use this feature, you must activate it following the procedure in "Activating the Inquire option (TI) through ISPF" on page 179.

Using the Inquire option (TI) through ISPF

1 From the first screen of the Data Set List utility, specify data set search values and produce a list of data sets based on these values.

2 In the resulting list of the data sets, enter **TI** next to the data set name for which you want to retrieve information from the Media database. A screen similar to the following is displayed with the information from the Media database for that data set:

Figure 52   Example CONTROL-M/Tape Inquiry screen

```
-------------------------- CONTROL-M/Tape Inquiry -------------------------
 COMMAND ===>

 Data Set Name......: K27.TEST.TAPE

 General Information                       Creation Information
 Volser / Label num.: CTT026 / 00001      Date...........: 2006/01/23
 Status.............: ACTIVE              Time...........: 10:13
 Media / Format.....: 3590     / 18TRACK  Job Name.......: K27AFCRE
 Record Format......: F                   Program Name...: CTTFCRE
 Record Size........: 00800
 Block Size.........: 0000000800          Last Used Information
 Number of Blocks...: 000002              Access Mode....: CREATE
 Compressed Size....: 00000 KB            Date...........: 2006/01/23
 Uncompressed Size..: 00002 KB            Time...........: 10:13
 Vol Used Percent...: 000%                Job Name.......: K27AFCRE

 Retention Information
 Retention..........: DATE 2006/01/26

 Volume Information
 Location / Slot....: MAINLIB  /          Volume Count...: 0001

 Secondary Volumes..:
```

Activating the Inquire option (TI) through ISPF

1 In the TI member in the IOA.SAMPLE library, change the <&ILPREFA> string to the INCONTROL installation prefix (the value of the ICE variable &ILPREFA).

2 Copy this TI member to one of the libraries that is allocated to the SYSEXEC DD statement under your TSO procedure.

3 Add the following lines to your TSO procedure, and change the <&ILPREFA> string to the INCONTROL installation prefix.

```
//DAPARM DD DISP=SHR,DSN=<&ILPREFA>.PARM
//       DD DISP=SHR,DSN=<&ILPREFA>.IOAENV
```

Index

Symbols

Numerics

A

B

C

Notes

85646